THE Journal

OF THE AMERICAN DENTAL ASSOCIATION

APRIL

1952

CONTENTS

Study of enamel by electron microscopy—Scott 377
Temporomandibular joint—Miller 386
Anterior fixed bridge prosthesis—Pinkerton 393
Occlusal disharmonies—Nuttall 399
Removable pontics for fixed bridgework—Kaye 409
Equilibration of occlusion of natural dentition—Shore 414
Anesthesia in oral surgery—Lorhan 427
Recording centric position and vertical dimension—Pyott 430
Cases and comments 437
Reports of councils 440
Editorials 457
Washington news letter 461
News of dentistry 463
Book reviews 479
Current literature 480
Deaths 482
Directory 484
Announcements 486

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VOLUME 44
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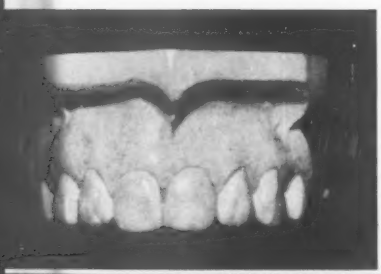

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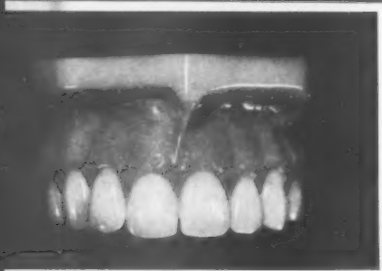

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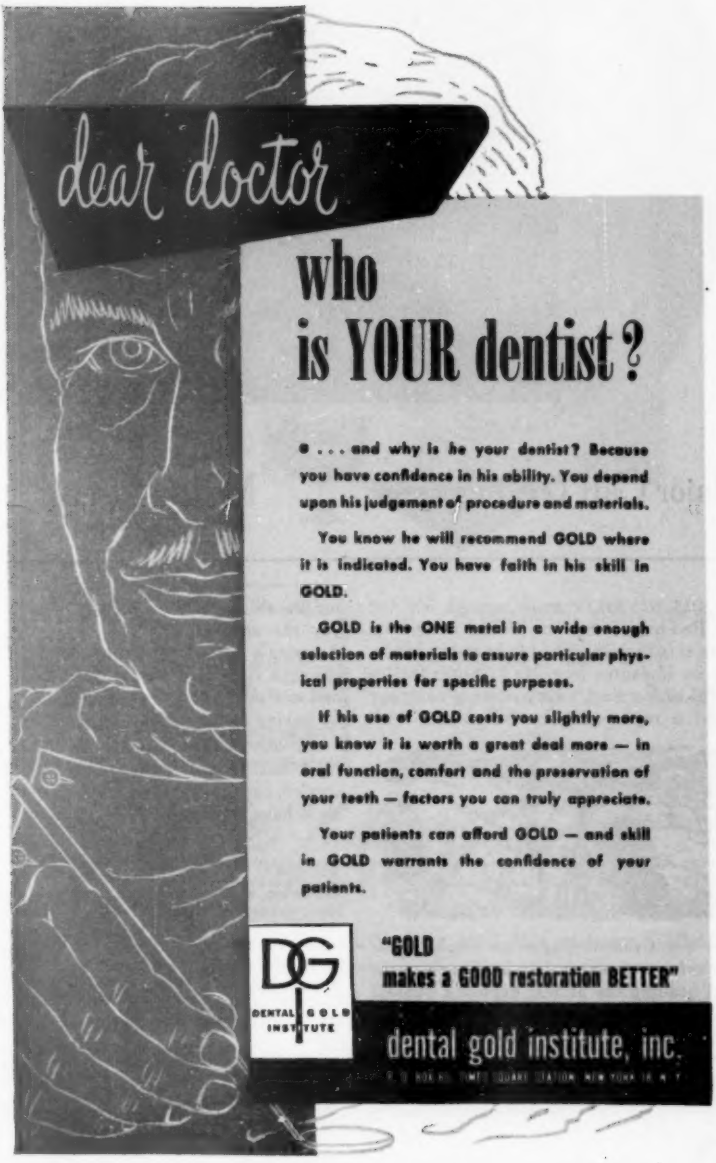
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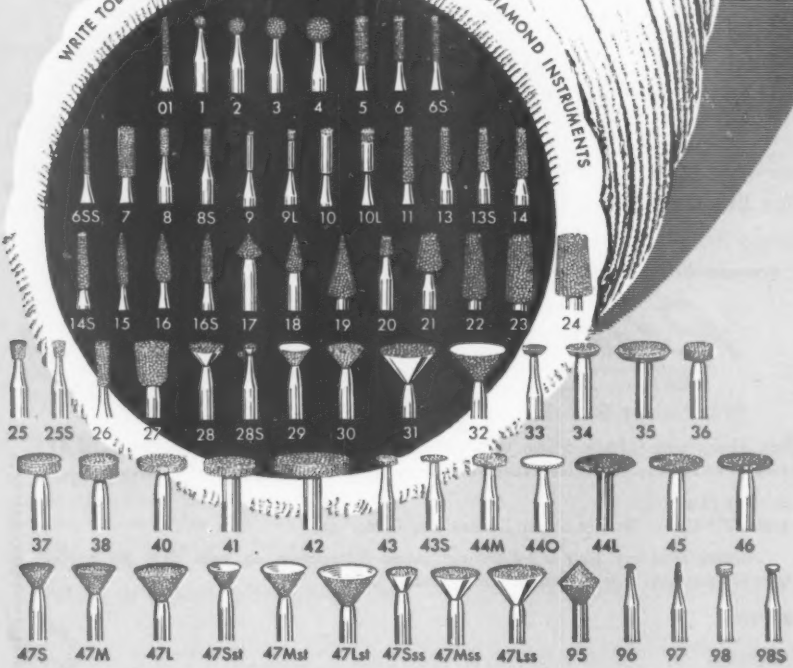

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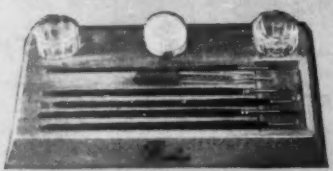

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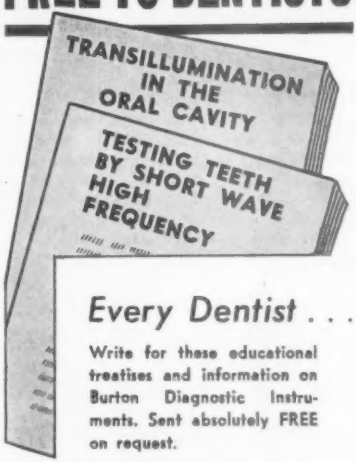

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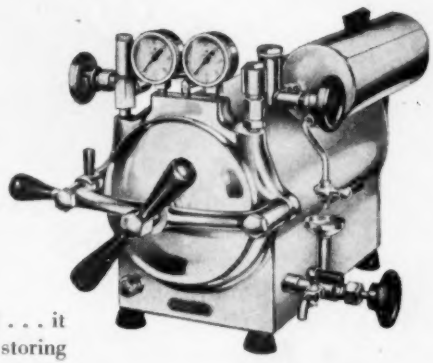

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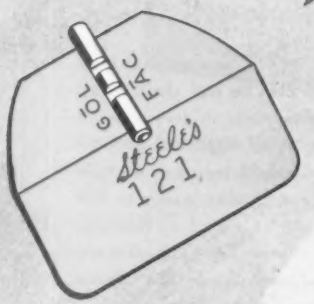

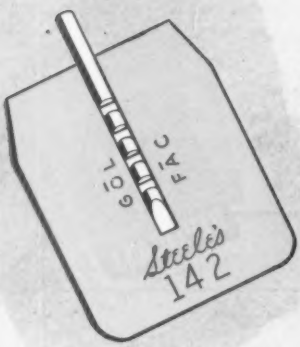

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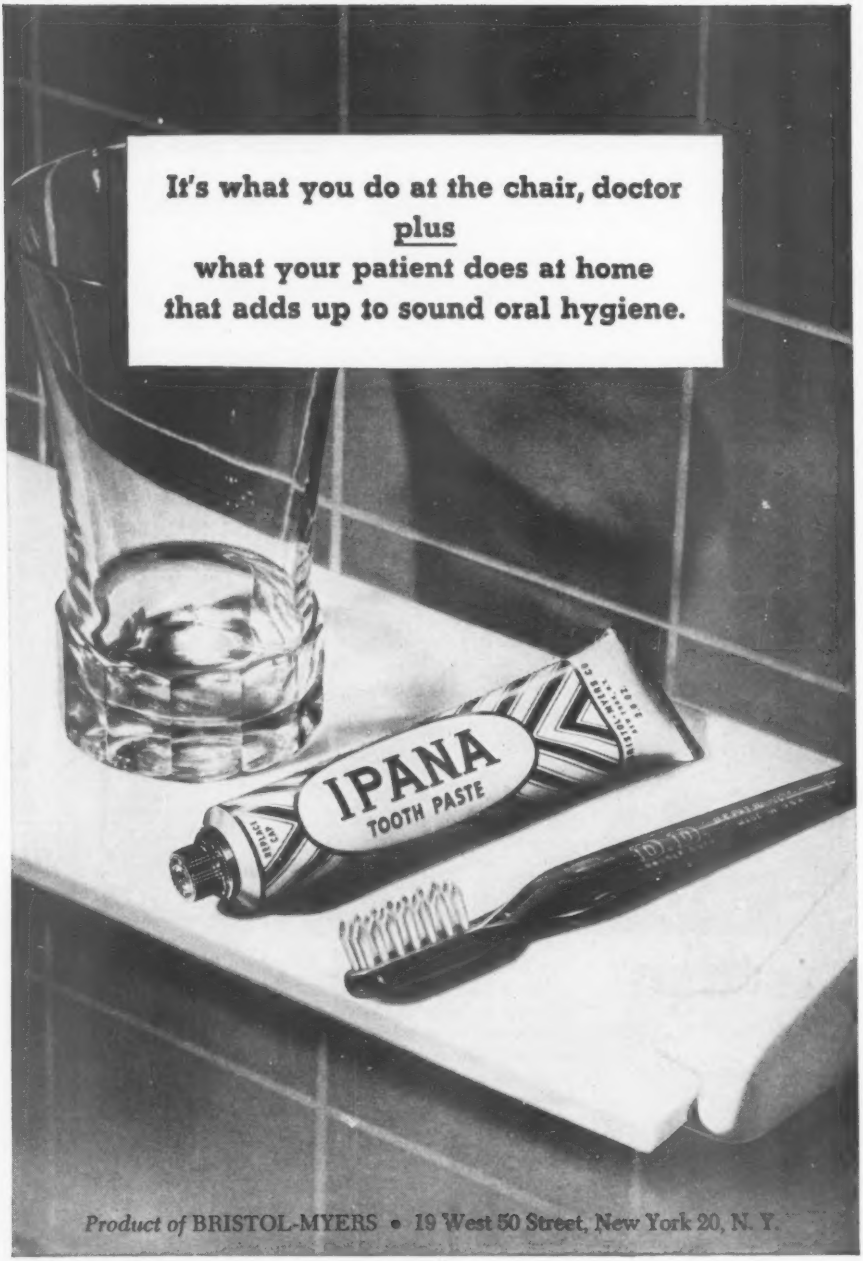
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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

VOLUME 44 • NUMBER 4

The study of enamel by electron microscopy

David B. Scott, D.D.S., M.S., and Ralph W. G. Wyckoff,† Ph.D., Bethesda, Md.*

During the century and a half that enamel has been studied under the optical microscope the preparation of suitable specimens has been a source of much difficulty. This is largely because enamel is the densest, the hardest and the most brittle of all biologic tissues. The earliest method of study, and the one still in commonest use, was examination of ground sections of extracted teeth. The basic principle of section-grinding has not changed over the years, and even though procedures and machines have been developed to a point where as many as two dozen nearly perfect sections can be prepared easily and rapidly from a single tooth, the thickness of the finished sections still is seldom less than 25 micra. The full resolving power of the optical microscope cannot be realized with such thick specimens, and there is little prospect that the situation can be measurably improved. It is a mark of the great ingenuity and perceptiveness of the early workers that from preparations of this type they should have described essentially all of the known structural components of the enamel in a way that is still preeminently acceptable.

Toward the close of the nineteenth century, new technics were developed whereby fully calcified teeth could be demineralized to permit sectioning by the methods developed for microtomy of soft tissues. In sections prepared in this manner little or nothing remained of the enamel, and this led to the opinion that it was composed entirely of inorganic matter. The continuing belief by some histologists, however, that an organic framework persists throughout mature enamel fostered a further, and eventually

Presented in a symposium before the Section on Research, ninety-second annual session of the American Dental Association, Washington, D.C., October 18, 1951.

*Dental surgeon, National Institute of Dental Research, National Institutes of Health, Public Health Service, Federal Security Agency.

†Scientist director, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Public Health Service, Federal Security Agency.

successful, search for methods by which such a nonmineral component could be preserved and revealed. These procedures have all depended basically on careful demineralization and they have gradually been improved to a point where large quantities of enamel matrix can now be isolated. The principal feature seen in sections of such material under the optical microscope has been a network outlining the regions which, prior to demineralization, were occupied by the enamel prisms. It has been satisfactorily demonstrated that this network is made up primarily of prism sheaths, but, since the prisms are separated by only about one micron of interprismatic substance, it has been difficult to obtain a clear resolution of adjacent sheaths into individual entities. Such examinations have not definitely determined if the prism sheaths constitute the entire organic framework of mature enamel, or if there is additional organic material between the prism sheaths and within the prisms themselves. This has been a controversial issue and sufficient work has been done to indicate that the question probably cannot be settled by optical microscopy.

In contrast to the progress that has been made in isolating and examining the organic matrix of mature enamel, attempts to observe the inorganic, crystalline component under the optical microscope have not met with success. Although much information on this component has been forthcoming from studies using roentgen ray diffraction, polarized light, and soft roentgen rays (grenz-rays), the individual enamel crystals have not been seen. In fact, the evidence indicates that these crystals are too small to be visible under the optical microscope.

In addition to the many studies of mature enamel, considerable work has been done to determine how it is formed and calcified. There have been extensive investigations of the appositional pattern in which the ameloblasts lay down the enamel matrix and of the sequence in which the inorganic salts are deposited within the matrix. The developing enamel matrix appears homogeneous, however, under the optical microscope, and its fine structure as well as the changes in this structure which occur during calcification have not been clearly visualized. In calcifying enamel, as in the case of mature enamel, the inorganic crystals have not been seen.

Thus it is evident that serious restrictions are imposed on the study of enamel structure both by the character of the specimens that have been available and by the limited resolving power of the optical microscope that has been used to view them. Future work undoubtedly will continue the improvement of technics to yield more revealing specimens, but the lower limit of what can be seen under the optical microscope is fixed. This latter fact has made an attack on the enamel structure with the electron microscope especially important, since this instrument has more than a hundred times the resolving power of the optical microscope, with a correspondingly greater useful magnifying power.

SPECIMEN PREPARATION

Specimen preparation continues to be the principal problem when applying the electron microscope to the examination of enamel. The limited penetrating power of the electron beam in the present instruments requires that specimens must be no more than 0.2 micron in thickness and the difficulties encountered in making such thin preparations from enamel can be readily imagined. There is no obvious way of preparing sections of fully calcified enamel thin enough for electron microscopy, but within the last year it has been possible to apply the recently developed thin-sectioning methods to the study of both demineralized mature enamel and undemineralized developing enamel. Before this, however, profitable studies of enamel have been

made by a less direct method. This has involved preparation of a reproduction, or so-called replica, of the surface of a ground section in a sufficiently thin film. Various materials have been used for replicas,[1-7] but nearly all those prepared by the investigators in this laboratory have been made with collodion.[7-10] The procedure for making collodion replicas has been described elsewhere in detail.[7] A dilute collodion solution is applied to the surface of a ground section of enamel and after the film has dried the enamel is dissolved away from it by flotation in acid solution. The surface to be replicated is prepared in various fashions, the usual method being to polish it to a high finish and then etch it lightly to bring out the structural detail. After dissolving the enamel, the replica is picked up on electron microscope specimen screens, shadowed with metal, and examined under the electron microscope. The shadowing, which has become a standard procedure in electron microscopy, greatly improves contrast and stability under the electron beam. It is done by the oblique evaporation of a thin coating of metal, only a few atoms thick, on to the surfaces of otherwise finished specimens.

The development of thin-sectioning methods has by no means rendered the replica technic obsolete, for it is still the only means at hand for studying fully mineralized enamel. The ability to cut sections of demineralized enamel for direct examination, however, has tremendously extended the scope of electron microscope studies. In particular, it permits observation of enamel structure at high magnification in preparations comparable to those that have been studied for many years with the optical microscope.

The preparation of suitable sections is a most delicate procedure, for they must be both ultra-thin and no more than a square millimeter in area, the latter limitation being set both by the sectioning method itself, and by the size of the sample which can be accommodated within the electron microscope. A plastic embedding and thermal expansion technic[11] for sectioning has been employed by the investigators in this laboratory which avoids many of the difficulties inherent in the use of more familiar embedding materials and readily gives sections a fraction of a micron thick. In this method, small pieces of tissue, after fixation and dehydration, are placed in gelatin capsules containing a mixture of butyl and methyl methacrylate monomers and the plastic is polymerized in an oven at 45°C. Sections are cut from the resulting embedding on a standard rotary microtome which has as specimen holder a brass block that can be cooled a few degrees below room temperature by evaporating carbon dioxide. As a result of such cooling the block contracts slightly. The block is then brought forward until the embedding is in line with the microtome knife and the advancing mechanism of the microtome is disconnected. As the block warms toward room temperature

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10. Scott, D. B., and others. Electron microscopy of mature enamel. (In press).

11. Newman, S. B.; Borysko, E., and Swerdlow, M. Uutra-microtomy by a new method. J. Res. Nat. Bur. Stand. 43:183 (Sept.) 1949.

it expands, and the consequent forward advance of the embedding is minute and slow enough to permit sections of the desired thickness to be cut. In a single cooling as many as 50 sections can be made. In place of the standard metal microtome knife, the glass knife recently described[12] has been used to good advantage for this sectioning.

After cutting, the sections are transferred from the knife to the surface of dioxane for flattening, thence to a water surface for washing. They are picked up from the water surface on specimen screens, and, after drying, the plastic is removed with suitable solvents. Finally, the sections are shadowed, after which they are ready for examination under the electron microscope.

Thus far in these studies demineralized mature human enamel has been sectioned, and both demineralized and nondemineralized enamel from mouse and monkey teeth in various stages of development. Mouse teeth have proved useful, for they are so small that entire cross or longitudinal sections of molar crowns, and entire cross-sections of incisors, can be accommodated easily on the specimen screens and examined over their whole areas.

In the course of the studies, distortion, apparently the result of relatively rough handling, was noted in sections of demineralized mature human enamel which had been embedded as described above. Consequently, a double embedding procedure has been devised[13] in which thick ground sections of tooth crowns are embedded *in toto* in plastic immediately following demineralization, care being taken to avoid handling or other disturbance of the tissue. Pieces of the proper size for sectioning are then cut from this primary embedding and reembedded in the standard capsules, this being necessary to provide blocks which can be adequately supported in the microtome. Besides affording superior sections, this method has proved of great value in permitting an exact localization of the region of the enamel to be studied, and a predetermination of the direction of cutting.

EXPLORATIONS OF THE STRUCTURE OF ENAMEL

Over 10,000 micrographs have now been made in the laboratory of the National Institute of Dental Research from specimens prepared by the replica and thin-sectioning methods. The appearance of mature enamel as visualized in replicas depends to a great extent on the degree to which the surface of the ground section has been etched prior to replication. The variety of preparations that can thus be made has permitted an extensive exploration of the fine structure of enamel.[10] The typical appearance of the enamel prisms, the prism sheaths, and the interprismatic substance in replicas is shown in Figure 1. In most replicas a fine network of submicroscopic fibrils has been seen both within the prisms and in the interprismatic regions. Such a network also has been noted in replicas by other workers.[5,6] It has become evident, both in the enamel studies and in similar studies of the dentin,[14] that a complete removal of all the tooth substance from replicas cannot be achieved by acid or even a subsequent enzymatic treatment; as a consequence small quantities of organic matter have remained trapped on the collodion. In many respects this has proved fortunate, for almost certainly the organic residue has provided the fibrous detail seen on the replicas. The resulting fact that replicas are not simply reproductions of surface structure has, however, made in-

12. Latta, H., and Hartman, J. F. Use of a glass edge in thin sectioning for electron microscopy. Proc. Soc. Exp. Biol. & Med. 74:436 (June) 1950.

13. Sognnaes, R. F.; Scott, D. B.; Ussing, M. J., and Wyckoff, R. W. G. Electron microscopy of the enamel of the teeth in various stages of development. In press.

14. Scott, D. B., and Wyckoff, R. W. G. Electron microscopy of human dentin. J. D. Res. 29:556 (Aug.) 1950.

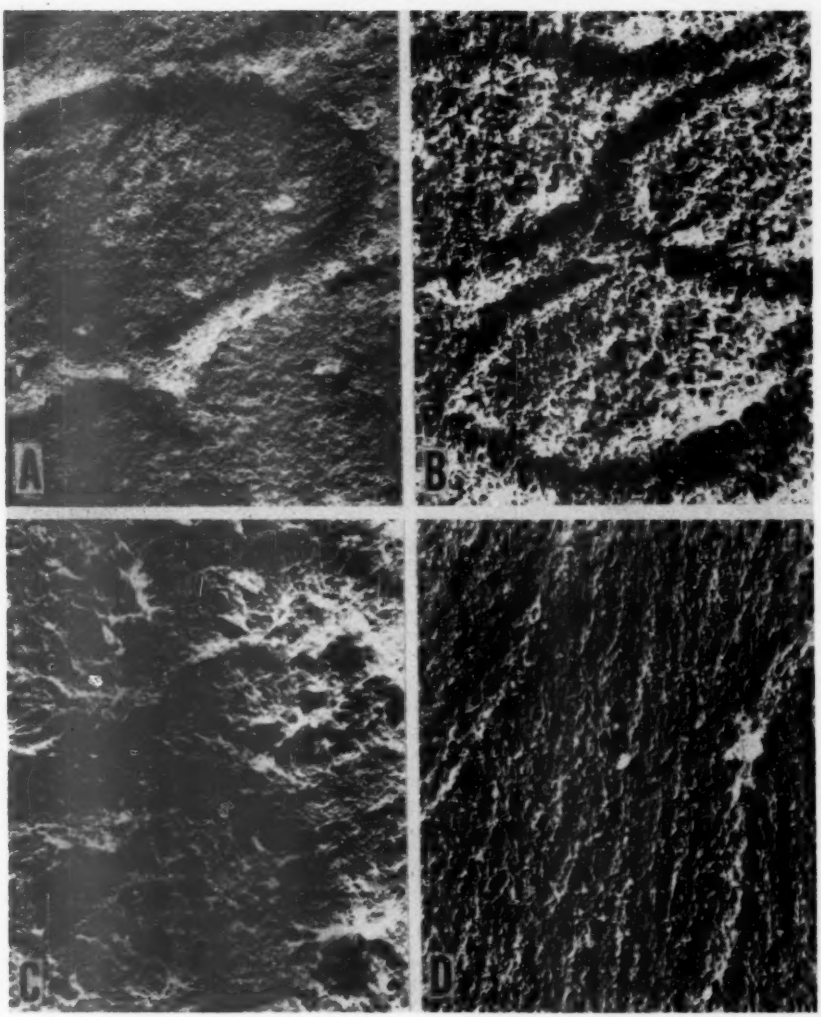

Fig. 1. Electron micrographs of replicas made from the surfaces of etched ground sections of mature human enamel. (A) Lightly etched cross-section showing granular structure within and between prisms; (B and C) deeply etched cross-sections showing fibrillar network within and between prisms; (D) lightly etched longitudinal section showing fibrillar network within and between prisms. Magnifications: X8300

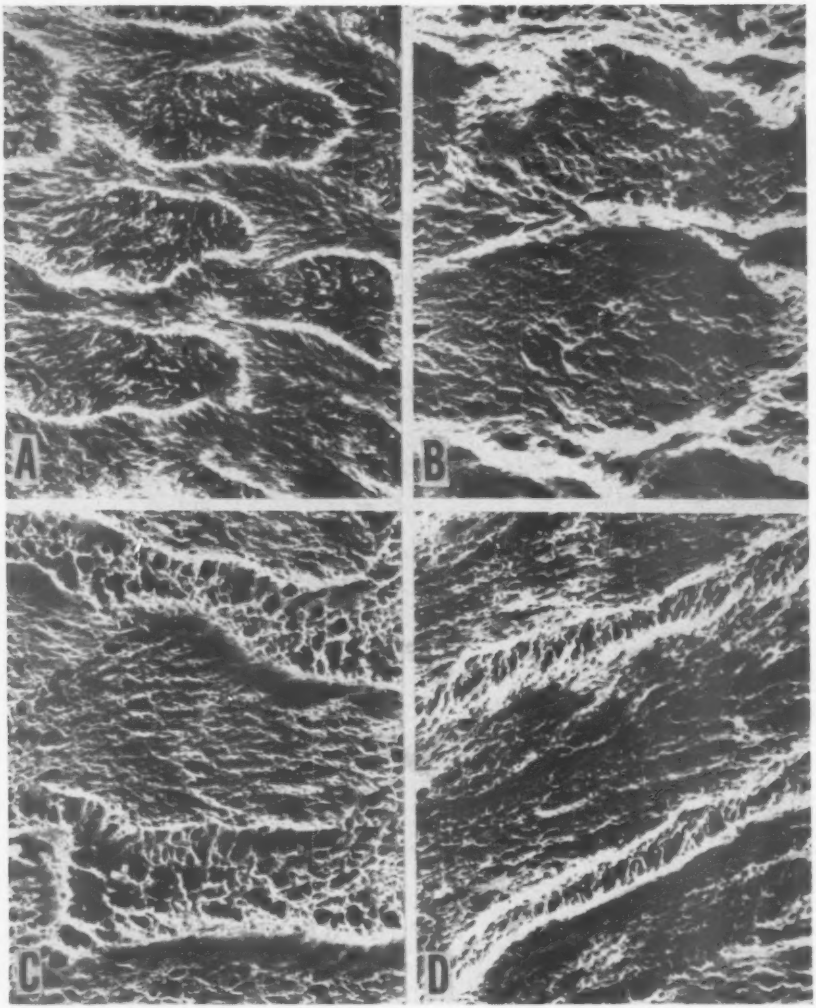

Fig. 2. Electron micrographs of thin sections of demineralized mature human enamel. (A) Cross-section showing prism sheaths and organic network within and between prisms; (B) slightly thinner cross-section showing individual intraprismatic fibrils more clearly; (C) oblique section showing fibrillar network within and between prisms; (D) longitudinal section showing interprismatic fibrils extending crosswise between prism sheaths. Magnifications: X6700

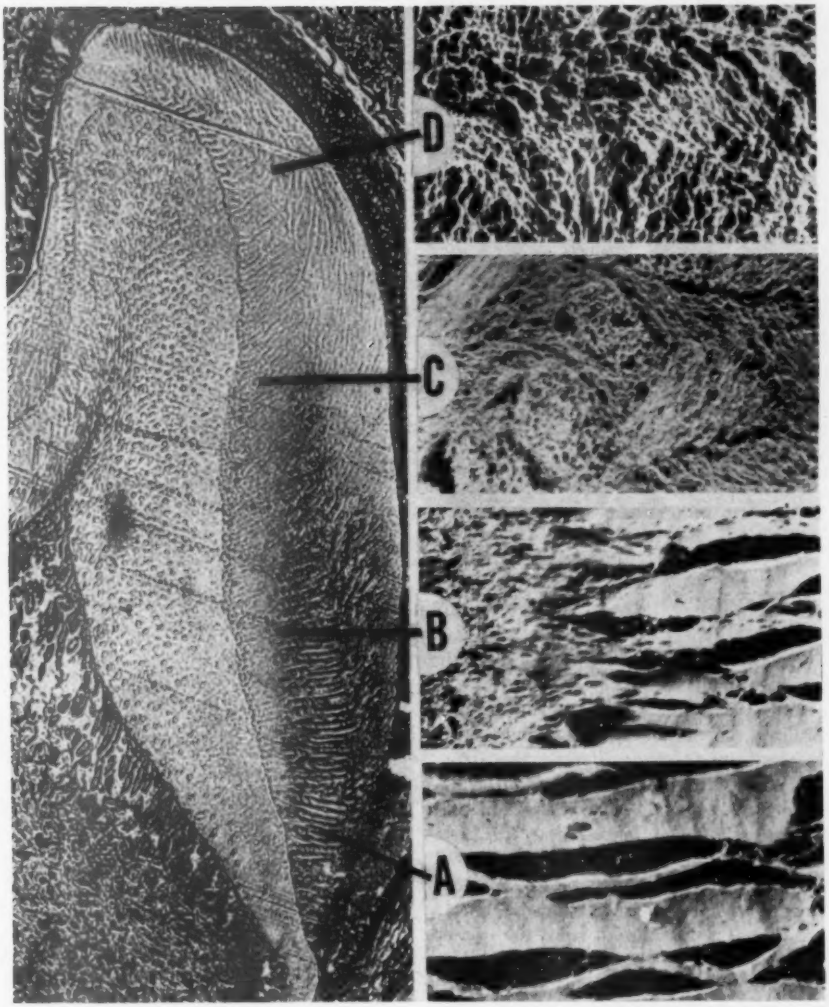

Fig. 3. Stages in enamel maturation, as seen under the electron microscope in a thin section through a developing molar from a 12 day old mouse. Tooth fixed and demineralized in Zenker's solution. At left is photomicrograph (X300) showing regions of section from which electron micrographs A-D were made; (A) immature stage, in which matrix appears homogeneous; (B) transitional stage, in which fibril formation is beginning; (C) intermediate stage, in which matrix shows closely packed fibers; (D) mature stage, in which matrix fibrils are widely spaced. Magnifications: X8300

Fig. 4. Crystal-like particles in a section of undemineralized enamel from a developing monkey molar. Magnification: X21,000

terpretation of the electron micrographs more difficult.

Observation of thin sections of demineralized mature enamel has provided the opportunity to study directly the structures noted in the replicas, and the existence of a fibrillar network within and between the enamel prisms has thus been definitely confirmed (Fig. 2).[10] Figure 2 also shows the sheaths that delimit the prisms, and in other micrographs there has been a suggestion that the prism sheaths themselves may be fibrous.[10] The fibrils in the interprismatic substance appear to extend more or less crosswise between prism sheaths (Fig. 2, C, D), but thus far conclusions have not been reached regarding the orientation of the fibrils within the prisms.

When the fibrillar network within and between the prisms was observed in the matrix of mature enamel, it became of interest to find out if the submicroscopic fibrils are already present when the organic matrix is first laid down, or if, even under the electron microscope, the immature matrix appears as structureless as it does under the optical microscope. In the thin sections of developing mouse enamel which have been examined under the electron microscope the fibrils have not been distinguished in freshly-formed matrix, and the substance has seemed devoid of a characteristic fine texture. Recent work has shown further that the matrix becomes fibrillar during calcification, the fibrils at first being packed closely together, and later more and more separated as the enamel approaches complete maturity.[13] The appearance of the matrix at different stages in enamel maturation is shown in Figure 3. The photomicrograph, to which the electron micrographs have been related by connecting lines, shows how it is possible in sections of partly calcified mouse molars to see all the stages simultaneously. This is because the cuspal regions of molars reach full maturity considerably in advance of the cervical regions.

The mechanism by which these changes in matrix structure are brought about is not known, but related chemical studies[15,16,17] suggest that the reduction in matrix volume which occurs during calcification may be effected through dehydration and condensation, rather than by loss of the organic substance itself.

Progress comparable to that made in the electron microscopy of the organic component of the enamel has not been made in the investigation of the inorganic fraction. The only available means for studying the crystalline texture of fully

15. Deakins, M. Changes in the ash, water, and organic content of pig enamel during calcification. J. D. Res. 21:429 (Oct.). 1942.

16. Deakins, M. and Burt, R. L. The deposition of calcium, phosphorus, and carbon dioxide in calcifying dental enamel. J. Biol. Chem. 156:77 (Nov.) 1944.

17. Buck, R. C. Minerals of normal and atherosclerotic aortas. Arch. Path. 51:319 (March) 1951.

calcified enamel has been through the use of replicas. It had been hoped that the ground sections from which the replicas have been made might be etched so as to reveal crystal outlines, but all attempts with various types of acids, used at different concentrations and for different lengths of time, have so far produced only a granular texture in both the interprismatic and intraprismatic regions. Whether or not any significance should be attached to the mesh-like submicroscopic fibrillar network which has been noted in such preparations and in sections of demineralized enamel has not been determined. The size and shape of the openings in this mesh conceivably could set upper limits to the dimensions of single crystalline ingredients of the enamel.

In contrast to the foregoing observations, crystal-like particles have been seen (Fig. 4) in those specimens of developing monkey enamel which have been soft enough to section without preliminary demineralization. Further work is now under way to find out if they are complete single crystals, or pieces of crystals which were fragmented during specimen preparation. Whatever they may be, it has been demonstrated by electron diffraction that crystalline apatite is present in the sections.[13]

SUMMARY

The morphological approach that has in the past been made to the study of enamel structure, and the manner in which the electron microscope is beginning to further this approach, have been described briefly. Use of this new instrument is still in its early stages but the results to date demonstrate clearly its great potentialities. In time, as further progress is made in specimen preparation and instrumentation, and as more observations are made, knowledge of the structure and formation of the enamel will inevitably be greatly extended. For some time yet it will be essential to investigate normal enamel and to relate the electron microscopic findings carefully to those made earlier with the optical microscope. After this necessary background has been established, it will be feasible to proceed to studies of the structure of defective and diseased enamel.

Worth Hearing Again • The amateur social doctors are like the amateur physicians—they always begin with the question of remedies, and they go at this without any diagnosis or any knowledge of the anatomy or the physiology of society. They never have any doubt of the efficacy of their remedies. They never take account of any ulterior effects which may be apprehended from the remedy itself. It generally troubles them not a whit that their remedy implies a complete reconstruction of society, or even a reconstruction of human nature. Against all such social quackery the obvious injunction to the quacks is, to mind their own business. *William Graham Sumner, "What Social Classes Owe to Each Other," 1883.*

The temporomandibular joint

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One of the problems of medicine and dentistry is the dysfunctions of the temporomandibular joint, one of the most complicated and unique joints of the body.[1] Treatment of the dysfunctions is complicated by the difficulty in determining when the joint becomes an etiologic factor in producing the more or less bizarre syndromes attributed to it. Undoubtedly, a contributing factor to this confusion is the amazingly spectacular relief from discomfort experienced by the patient when treated according to the precepts of one of the several schools of thought on the subject.[2]

Most clinicians are familiar with the effects of violent extrinsic trauma. The symptoms of unilateral or bilateral dislocation of the temporomandibular joint would be difficult, if not impossible to misinterpret. It is a different problem to diagnose the symptoms caused by an intrinsic traumatic factor.[3]

Patients, knowing the temporomandibular joint to be the etiologic factor of their discomfort, will often describe painful symptoms referred to the ear, the temporal region, the side of the face and down into the neck. They also report that the intensity of these painful symptoms varies from excruciating to complete alleviation for various lengths of time, with or without treatment.[4]

Costen,[5] Block and Harris[6] and others report that this area of referred pain extends from the regions of the occiput and the parietal bones to the frontal sinus and down into the throat. They also report that their patients have exhibited one or all of the following symptoms: progressive loss of hearing; pain within and about the ears; tinnitus; mild catarrhal deafness; dizziness due to the occlusion of the eustachian tubes; sinus headache without sinus or eye involvement; a burning sensation of the tongue, throat, or nose; a disturbed function of the salivary glands.[5,6] Others[7,8,9] report that treatment of the temporomandibular joint dysfunction has permanently cured or greatly improved some or all of these symptoms. Goodfriend[7] reports that one of his successfully treated patients has been hospitalized with a diagnosis of

The opinions and assertions contained in this article are the private ones of the author, and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

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1. Rixford, Emmet. The development and changes, physiological and pathological, in the temporomandibular articulation. Pacific Den. Gaz. 35:488 (Aug.) 1927.

2. Waldron, C. W. The temporomandibular joint (editorial). J. Oral Surg. 3:1 (Jan.) 1945.

3. Gerry, Roger G. The clinical problems of the temporomandibular articulation. J.A.D.A. 34:261 (Feb. 15) 1947.

4. Ballinger, D. H. Present status of arthrosis of the temporomandibular joint. J. Oral Surg. 6:9 (Jan.) 1948.

5. Costen, J. B. Neuralgias and ear symptoms associated with disturbed function of the temporomandibular joint. J.A.M.A. 107:252 (July 25) 1936.

6. Block, Louis S., and Harris, Elam. An approach to a rational study and treatment of the temporomandibular joint problems. J.A.D.A. 29:349 (March) 1942.

7. Goodfriend, David J. Deafness, tinnitus, vertigo and neuralgia. Arch. Otolaryng. 46:1 (July) 1947.

8. Bleiker, Ross F. Ear disturbance of temporomandibular origin. J.A.D.A. and D. Cosmos 25:1390 (Sept.) 1938.

9. Parry, L. G. Costen's syndrome; a report of two cases. J.A.D.A. 35:831 (Dec. 1) 1947.

Ménière's syndrome; the otoneurologic diagnosis was toxic bilateral labrynthitis. Pippin[10] reports that three of his patients were admitted to the hospital with a diagnosis of trigeminal neuralgia. Seaver[11] states that, "there may be functional disturbances of the general nervous system through fear and pain, such that personality changes develop, even neuroses and psychoneurosis."

Periodontal disease can be related to dysfunction of the temporomandibular joint. It is common for patients to exhibit limited or distorted motion during the eccentric excursions of the mandible.

That dysfunction of this joint is common is shown by Goodfriend[7] and Brussell[12] in the results of their separate surveys. They reported, respectively, that 55 per cent and 63 per cent of the patients examined showed evidence of temporomandibular joint involvement. Their surveys also showed that the percentage of persons afflicted with joint symptoms increased in direct ratio to their age. Throughout the literature it is evident that the great majority of patients, about 95 per cent, are unaware of their temporomandibular joint dysfunction. It is not until the syndrome and its painful exacerbations approach the unbearable that these patients seek treatment. It depends on the particular characteristics that the symptoms exhibit to determine whether the physician or dentist is chosen to render that treatment.

ANATOMIC FEATURES

Another important factor to be considered is the anatomic location of the temporomandibular joint. Examination at necropsy is next to impossible because of the disfiguring dissection required to view the joint, unless it is approached from inside the skull. This lack of fresh experimental subjects certainly contributes to the limited knowledge of the joint.

Rixford[1] states, "the mandibular joint is almost unique in the body in some of its particulars and presents some anatomic features peculiar to itself. For example, it is the only joint in the body in which there can be dislocation without rupture of the capsule. For the same reason, viz., the great extent and laxity of the capsule, the mandibular joint permits an extraordinary variety of motions; in fact there is hardly any other joint which will permit so many kinds of motion."

Functionally the temporomandibular joint combines the movements of a diarthrodial joint and a ginglymus joint. This is possible because each joint is composed of two distinct articulations: one, between the condyle and the articular disk where the ginglymus movement occurs; the other, between the articular disk and the temporal bone where the arthrodial movement takes place. The simultaneous action by these two articulations, plus the fact that each motion is compensated by the joint on the opposite side, produces the complicated movements of the mandible.

The superior articulating surface of the temporomandibular joint is located on the basal surface of the squamous portion of the temporal bone. It presents, inferiorly, a convexoconcave surface anteroposteriorly. The convex portion of the surface is the articular tubercle which is formed by the anterior root of the zygomatic process. It is also the anterior limit of the joint, separating it from the infratemporal fossa. The concave portion of the surface is the mandibular fossa. It is continuous with the articular tubercle and ends posteriorly in the posterior articular process which separates the joint

10. Pippin, B. N. Symposium on treatment of temporomandibular lesions caused by denture mutilation. Illinois D. J. 12:429 (Oct.) 1943.

11. Seaver, E. P., Jr. Temporomandibular joint malocclusion and the inner ear, a neuromuscular explanation. Ann. Otol., Rhin. & Laryng. 46:140 (March) 1937.

12. Brussell, I. J. Temporomandibular joint diseases: differential diagnosis and treatment. J.A.D.A. 39:532 (Nov.) 1949.

from the tympanic portion of the temporal bone. The mandibular fossa is shaped to accommodate the head of the condyle, and its longitudinal axis is in a medial and slightly posterior position. The articulating surface is covered with fibrocartilage. This includes the articular tubercle and the adjacent anterior portion of the mandibular fossa.

The fossa faces what could be considered the major pull of the lateral pterygoid muscles and directly toward the infratemporal fossa and the origin of the lateral pterygoid muscles.[13]

The inferior articular surface of the temporomandibular joint is located on the anterior aspect of the head of the condylar process. This surface is covered with cartilage similar to the superior articulating surface. The head of the condyloid process is roughly a thick cylinder, although there are infinite variations in shape, in the same individual as well as in different individuals. It is convex in all directions, and it is of greater diameter in external to internal direction than it is anteroposteriorly. Its longitudinal axis is medialward and slightly posterior to conform with the longitudinal axis of the mandibular fossa. These bony structures are incorporated into a joint by the enveloping fibrocartilaginous articular capsule and its synovial membranous lining.[14] It is attached above and anterior to the margins of the articular tubercle and posterior to the margins of the mandibular fossa of the temporal bone.[15] It is attached below to the neck of the condyle. The superior attachment of the capsule is loose, permitting gliding action between the articular disk and the superior articulating surface. The capsule is tightly bound to the neck of the condyle at its inferior attachment. This, plus the rigid attachment of the articular capsule to the articular disk, accounts for the articular disk and condyle acting as a unit in the arthrodial movement while permitting the ginglymus or hinge action between them.[16] The path of the condyle is the path of the articular disk.

The articular disk is a fibrocartilaginous oval. It is relatively thin, ending posteriorly in a thickened border. It is so shaped that it fits both the superior and inferior articulating surfaces. It changes shape to adjust for the irregularities of the articulating surfaces, and its elasticity allows for absorption of shock and compression. Forward, medially and laterally, it is attached at its periphery to the articular capsule. This attachment is greatly strengthened by fibers from the lateral accessory ligament and the lateral pterygoid muscle. Posteriorly the disk is continuous with a thick layer of connective tissue that fuses with the posterior wall of the articular capsule. The close fixation of the articular disk to the head of the condyle is also owing to these last named attachments.[17] This disk completely divides the joint in two, forming a superior and inferior joint and joint spaces. Both joint spaces are completely lined with synovial membrane.[14]

The accessory ligaments are the temporomandibular, the sphenomandibular and the stylomandibular. These are cartilaginous and their function is purely support of the joint. The short, thick, double-headed, lateral pterygoid muscle moves the head of the condyle and the articular disk forward during eccentric mandibular excursions. Its origin is from the infratemporal surface of the greater wing of the sphenoid bone and the lateral plate of the pterygoid process. Its insertion is in the articular capsule, the articular disk and the fovea on the anterior surface of

13. Vaughn, Homer Cree. Study of the temporomandibular articulation. J.A.D.A. 30:1501 (Oct.) 1943.

14. Robinson, M. The temporomandibular joint: theory of reflex controlled nonlever action of the mandible. J.A.D.A. 33:1260 (Oct.) 1946.

15. Shapiro, H. H. Applied anatomy of the head and neck, ed. 2. Philadelphia, Lippincott, 1947.

16. Goss, C. M., (editor). Anatomy of the Human Body, ed. 25. Philadelphia, Lea & Febiger, 1948, p. 273.

17. Sicher, Harry. Oral anatomy. St. Louis, Mosby Co., 1949, p. 157-177.

the neck of the condyle. The outward direction of the thick fibers makes possible its function. The lateral pterygoid muscle is the only muscle that moves the mandible forward. Mandibular function depends on the action of the other muscles of mastication in conjunction with the lateral pterygoid. The lateral pterygoid muscle also maintains the condylar articular disk relationship during forceful closing while the condyle is on the posterior slope of the articular eminence. It acts as a balancing and braking element.[18]

TEMPOROMANDIBULAR JOINT DISEASES

Gerry[3] has classified all diseases of this joint into three groups: those caused by systemic disturbances; those caused by malocclusion or absence of teeth; those caused by external trauma and dislocation.

The joint dysfunctions associated with the first group would necessarily be treated with the systemic treatment of the generalized pathologic process. This is true of rheumatoid arthritis.[19] In this disease about 50 per cent of the patients have temporomandibular joint involvement. It exhibits the same clinical signs and symptoms of any other arthritic joint. Limited motion but no ankylosis has been reported both during and immediately after an acute exacerbation of the disease. Dental treatment should consist of restricting mandibular movements as much as possible until the acute symptoms subside. A regular course of increasing jaw exercise should then be maintained until the patient has satisfactory mandibular function.

Hyperplasia of the head of the condyle is often seen in such diseases as osteochondroma, acromegaly, Paget's disease and osteoid arthritis. The effect is an excessive impulsion of the mandible down and forward with respect to the temporal bone.[20]

In the second group are placed the temporomandibular joint dysfunctions that result from intrinsic traumatic factors. Most important are the symptoms of temporomandibular arthrosis.[4] Premature contact between the cusps of malpositioned teeth causes the teeth to occlude in other than centric occlusion which displaces the head of the condyle.[21] Frequently the painful and noisy symptoms of this syndrome completely disappear or are tremendously improved when the traumatic condition has been removed. Also, in this group are the symptoms of Costen's syndrome,[22] a name given to a group of symptoms including painful involvement of the ear, decreased hearing, tinnitus, loss of eustachian tube patency caused by loss of vertical dimension in centric occlusion owing to the loss of the posterior teeth or by their abrasion. This loss of vertical dimension, according to Costen, allows the condyle to traumatize the articular disk causing wear and finally perforation, because the teeth do not fulfill their function as stops when the condyle is in its normal position of centric relation.[23] The condyle and mandibular fossa may show signs of wear to the extent that there may be an exposure of the dura immediately superior to the mandibular fossa. This loss of vertical dimension and resulting overclosure supposedly allows the condyle to move posteriorly beyond its normal position causing compression of the tissues that fill the space between the joint and the tympanic process. The compression of this tissue is sup-

18. Sicher, Harry. Temporomandibular articulation in mandibular overclosure. J.A.D.A. 36:131 (Feb.) 1948.

19. Russell, L. A., and Bayles, T. B. Temporomandibular joint in rheumatoid arthritis. J.A.D.A. 28:533 (April) 1941.

20. Parker, D. B. Ankylosis of the temporomandibular joint. J. Oral Surg. 6:42 (Jan.) 1948.

21. Schuyler, Clyde H. Fundamental principles in the correction of occlusal disharmony, natural and artificial. J.A.D.A. 22:1193 (July) 1935.

22. Costen, J. B. Neuralgias and ear symptoms associated with disturbed function of the temporomandibular joint. J.A.M.A. 107:252 (July 25) 1936.

23. Prentiss, H. J. Preliminary report upon the temporomandibular articulation in the human type. D. Cosmos 60:505 (June) 1918.

posedly relayed by the chorda tympani nerve in the pterygotympanic fissure and the auriculotemporal nerve at the neck of the condyle, producing auditory disturbances and neuralgias. It is also believed that overclosure allows a distal displacement of the mandible, causing a loss of patency of the eustachian tube owing to the compression of the soft tissues of the region.[6,8,10,12,24-27] Goodfriend[28] states, "The influence of the mandibular joint disease in the etiology of deafness is predisposing by trauma and inflammation; and exciting by reflex influence upon the auriculo-temporal nerve."

Many clinicians refute the theory of Costen's syndrome. Shapiro and Truex[29] state that they have never seen a perforation of the articular disk or of the roof of the mandibular fossa.

Sicher[30] also disclaims the possibility of condylar action causing bony erosion. He calls attention to the fact that about 20 per cent of all persons have congenital defects in the floor of the bony acoustic meatus which is caused by arrested development of the tympanic bone. He declares that the anatomic position of the auriculotemporal and chorda tympanic nerves is such that they are well protected. The chorda tympani nerve[30] is composed of parasympathetic fibers which are concerned with the taste mechanism of the anterior portion of the tongue and secretory fibers for the glands of the oral cavity.

Sicher describes a process of the tegmen tympani which is interposed between the tympanic and squamous portions of the temporal bone, which precludes condylar encroachment of the tympanic process. DeVere[31] is unable to demonstrate this process or this relationship. Others[32,33] give evidence that damage to the ear and to the patient's hearing is caused by congenital defects and inflammatory processes and not to the distal displacement of the head of the condyle. Sicher[18] and Shapiro and Truex[29] believe that occlusion of the eustachian tubes by compression of the surrounding soft tissues has no relationship to distal displacement of the head of the condyle.

Mandibular overclosure, on the other hand, will produce symptoms caused by a breakdown of muscular balance and a loss of normal relationship between the condyle and the articular disk. This causes an impairment of the forward sliding movement of the condyle and disk on the articular tubercle. The result is a deforming arthritis of traumatic origin.[29]

Goodfriend[34] states that malocclusion is the cause of the disease and restoration of the proper intermaxillary relations is the proper treatment. This has been noted at St. Albans.

The third group of Gerry's classification consists of temporomandibular dysfunctions caused by extraoral or extrinsic trauma. The most spectacular of these are dislocations and fractures of the neck of the condyle. Salman[35] has written at length concerning the treatment of both of these maladies, and he reports complete success by immobilizing the jaw

24. Costen, J. B. The mechanics of trismus and its occurrence in mandibular joint dysfunction. Ann. Otol., Rhin. & Laryng. 48:499 (June) 1939.

25. Wright, W. H. Deafness as influenced by malposition of the jaws. J.N.D.A. 7:979 (Dec.) 1920.

26. McGrane, H. F. Traumatic deafness caused by retrusion of the condyles of the mandible on the external auditory canal. J.A.D.A. 12:1231 (Oct.) 1925.

27. Monson, G. S. Occlusion as applied to crown and bridgework. J.N.D.A. 7:399 (May) 1920.

28. Goodfriend, D. J. Symptomatology and treatment of abnormalities of mandibular articulations. D. Cosmos 75:947 (Oct.) 1933.

29. Shapiro, H. H., and Truex, R. C. The temporomandibular joint and the auditory function. J.A.D.A. 30:1147 (Aug.) 1943.

30. Sicher, H. Some aspects of the anatomy and pathology of the temporomandibular joint. Bur 48:14 (April) 1948.

31. DeVere, C. A. Personal communication.

32. Connors, M. C. Tissue reactions in temporomandibular articulation following the loss of teeth. D. Cosmos 67:124 (Feb.) 1925.

33. Gillis, R. R. Roentgen-ray study of the temporomandibular articulation. J.A.D.A. 22:1321 (Aug.) 1935.

34. Goodfriend, D. J. Dysarthrosis and subarthrosis of mandibular articulation. D. Cosmos 74:523 (June) 1932.

35. Salman, Irving. Traumatic injuries to the temporomandibular joint. J. Oral Surg. 7:277 (Oct.) 1949.

with intermaxillary wiring for extended and varying lengths of time. He classifies subluxations as self-reducing dislocations and also prescribes intermaxillary wiring. Gerry[3] also reports success following the fixation of dislocations, particularly those in which edema is present in only one joint and where there is a shift of occlusion to the opposite side. These cases should be rested at least a week. This immediate treatment of dislocations is of the greatest importance since so many of them become chronic subluxations with resultant hypermobility of the joint. Gerry[3] also reports several interesting results with this treatment of cases of chronic dislocations. The patients received immediate relief from discomfort and many of them were permanently improved.

Dorrance[36] has treated hypermobility of the temporomandibular joint by producing scar tissue on the articular surfaces. He traumatizes the surfaces with a needle.

Schultz[37,38] has made extensive studies of hypermobility of the temporomandibular joint. He has written at length and advocates the injection of sclerosing agents into the joint cavity. The technic described is simple and the solutions used are readily available. They report relief from symptoms in from 6 to 24 hours. However, some joints which have greatly deteriorated cannot be helped in this manner and surgical treatment is the only recourse. At St. Albans it is felt that about 80 per cent of the cases treated have been definitely improved or cured. So far this group includes about 60 cases.

Down through the years there are to be found those clinicians that advocate extirpation of the articular disk as the treatment of temporomandibular arthrosis. Annadale,[39] in 1887, Lang,[40] in 1909, and Boman,[41] in 1947, advocate this radical procedure for those cases which have resisted the more conventional types of treatment. This surgical procedure, although accompanied with a temporary paresis of the facial nerve, is remarkably free of any permanent facial paralysis, considering the proximity of the facial nerve to the site of the operation.

After the articular disk has been removed, the patient is usually free of all symptoms and can masticate freely. A loosening of the insertion of the lower portion of the lateral pterygoid muscle, at the time of operation, will control the tendency toward dislocation. However, there are some permanent changes in the movements of the mandible, limiting the lateral excursion toward the untreated side. It stands to reason that there would be a change in the condylar path and in the vertical dimension of the physiological rest position on the affected side. There can be no doubt that when all other forms of treatment fail and the patient's symptoms are severe enough to warrant it, that this is the only recourse.

The Chalmers J. Lyons Club,[42] after an analysis of 120 cases of condylar fractures, came to the conclusion that intermaxillary fixation is the favored treatment, particularly when coupled with manipulation of the fragments in order to obtain better repositioning. They also found that function was not impaired and ankylosis did not occur in any of the cases, except one, even when the repositioning of the fragments was not accurate. It is in the fracture of the neck

36. Dorrance, G. M. Arthraplasty upon the temporomandibular joint. Ann. Surg. 79:485, 1924.

37. Schultz, L. W. Report of ten years' experience in treating hypermobility of temporomandibular joints. J. Oral Surg. 5:202 (July) 1947.

38. Schultz, L. W. Treatment by injection for subluxation of the temporomandibular joint. D. Digest 43:423 (Sept.) 1937.

39. Annadale, T. On displacement of the interarticular cartilage of the lower jaw and its treatment by operation. Lancet 1:411, 1887.

40. Lanz, A. B. Discitis mandibularis. Zentrahlal F. Chir. 36:289, 1909.

41. Boman, Karl. Temporomandibular joint arthrosis and its treatment by extirpation of the disk. Acta chir. Scandinav. 95:1, 1947.

42. Chalmers J. Lyons Club. Fractures involving the mandibular condyle: post-treatment survey of 120 cases. J. Oral Surg. 5:45 (Jan.) 1947.

of the condyle that the much maligned auriculotemporal nerve may become involved.

Ankylosis of the temporomandibular joint[20] is usually the result of an acute inflammatory condition caused by extrinsic trauma, although it may result from acute exanthematous diseases. It is most frequently found in very young children. Its onset is insidious with gradual limitation of motion over an extended period of a year or more. The treatment is condylectomy of the ankylosed condyle[43] or at least excision of a 2 cm. section of the superior portion of the ramus.[44,45] There is apparently no lasting deformity or malfunction following this operation. This proved to be true of the case done at St. Albans in March, 1949.

The histologic and anatomic findings of Robinson's[14] extensive study show conclusively that the temporomandibular joint is not a stress bearing joint. The stresses of mastication are received and dissipated by the dental arches as a result of the pull of the muscles of mastication. The histologic structures found in the joint also prove that the joint is free from stress. The articular disk is covered by a definite layer of synovial membrane which is found in diarthrodial joints only over nonstress bearing tissues. It is thick and vascular fibrocartilage which is only found in nonstress bearing areas. The absence of cancellous bone in the glenoid fossa makes it obvious that stresses are not transmitted by the condyle to the temporal bone.

ROENTGENOGRAMS OF DOUBTFUL VALUE

The structure and anatomic position of the temporomandibular joint does not permit the collection of roentgenograms of diagnostic value with any ease. Although the joint can be viewed in apparently clear pictures, it is probably conjecture to read into them "any evidence of the irregularities of bone destruction and any other abnormality of the bony structures."[29] The conditions which are necessary in order to take roengenograms of the joint make them of doubtful value even in considering the relationship of the head of the condyle to the other components of the temporomandibular joint.

Bleiker[8] reports success in the use of laminagrams, as suggested by Moore,[46] at a depth of 2.5 cm. However, Shapiro and Truex[29] state that laminagrams do not give a true picture and are of no diagnostic value. Gough[47] uses tomography for study of the temporomandibular joint. The anatomic relationship is supposedly good but differentiation is totally lacking.

Cinefluoroscopic study of mandibular movements does not appear to be of diagnostic value. However, it might be possible to gain more definite information of mandibular movements in both health and disease. This would undoubtedly change opinions as to the relative importance of contributing factors of temporomandibular arthrosis.

SUMMARY

The temporomandibular joint is a compound complex joint. Associated with its dysfunctions are painful symptoms extending over the side of the head, face and neck. Costen grouped these symptoms into a syndrome which now bears his name. Anatomists have proved

43. Dingman, Reed O. Ankylosis of temporomandibular joint. Am. J. Orthodont. (Oral Surg. Sect.) 32:120 (Feb.) 1946.

44. Thoma, Kurt H. Ankylosis of temporomandibular joint. Am. J. Orthodont. (Oral Surg. Sect.) 32:259 (May) 1946.

45. Brown, J. B., and Peterson, L. W. Ankylosis and trismus resulting from war wounds involving the coronoid region of the mandible: report of three cases. J. Oral Surg. 4:258 (July) 1946.

46. Moore, Sherwood. Body section roentgenography with laminagraph. Am. J. Roentgenol. 39:514 (April) 1938.

47. Gough, C. W. C. Tomography of the temporomandibular joint and ramus of the mandible. Brit. J. Radiol. 17:213 (July) 1944.

conclusively that the Costen school's explanation of this syndrome is anatomically impossible. It seems more plausible to accept arthritic changes in the joint as the etiologic factor of temporomandibular arthrosis. Subluxations, dislocations and fractures involving the joint are all treated by immobilization. Intermaxillary wiring is the preferred treatment. Equilibration of occlusion and establishing the proper vertical dimension in centric occlusion has been proved to be a prerequisite to the successful treatment of temporomandibular dysfunctions. Roentgenographic studies are not universally accepted as diagnostic aids in temporomandibular arthrosis.

CONCLUSIONS

Temporomandibular joint dysfunction is a problem of differential diagnosis. The complicated structure and function plus the anatomic location of the temporomandibular joint has led to many misconceptions concerning the etiology of temporomandibular joint arthrosis. The symptoms of temporomandibular joint syndromes do exist. They are owing to trauma either with or without arthritic changes. Treatment consists of removal of the traumatic etiologic factor, repair of the damage caused by trauma and palliative treatment of the arthritic changes.

Anterior fixed bridge prosthesis

Robert G. Pinkerton, D.D.S., Chicago

The purpose of this presentation is to describe a bridge construction in which alginate was used for the impression material. The restoration was an immediate fixed bridge which required extra precaution to assure seating after extraction. In most immediate restorations of this type it is safer to fit the retainers in the mouth before taking the final impression to complete the bridge.

The upper right central incisor was to be extracted. The right lateral incisor and the left central incisor were to be utilized as abutments. On the patient's first visit, a thorough mouth examination was made. Cavities, gum condition, occlusion, general health, missing teeth, shade of teeth, occupation and habits were listed. Roentgenograms were taken and alginate impressions of the entire upper and lower arches were made.

With the aid of the roentgenograms and the study casts, the best manner of restoring the mouth was determined. The alginate impressions were washed in running water, dried of free surface moisture and poured in stone. The resulting study casts were not altered in any way and they were kept as a record of the mouth before any work was begun.

After the initial set, the poured impressions were placed in a humidor to complete the setting. When set, the models were removed from the impres-

Presented before the eighty-sixth Midwinter Meeting of the Chicago Dental Society, February 5, 1951.

Fig. 1 • Duplicate model used for pontic selection and for making T bands for direct wax carving

sions which were then repoured in half and half, plaster and stone. The original models were mounted in an adjustable articulator and the mandibular excursions studied. The duplicate models were used for pontic selection and for making accurately fitting T bands for direct wax carving (Fig. 1).

At the patient's second appointment, after the roentgenograms, casts and examination chart had been studied, a definite plan of procedure was outlined and explained to the patient. Neither of the abutment teeth were carious and retainers of the extracoronal type were indicated. Although esthetics were important to this individual, cutting jacket thimble crown preparations were not necessary or justified.

Preliminary preparations on the duplicate casts indicated that inlays would give sufficient retention without undue metallic display and cause the least loss of tooth structure.

Since an immediate fixed bridge was acceptable to the patient, the retainer and abutment preparations were made following the usual procedures for such preparations.[1] A pin inlay was prepared for the left central incisor and a three-quarter veneer crown prepared for the right lateral incisor with a short pin in its cingulum.

The upper impression and wax bite were then taken. The lower cast of the duplicate model previously made was used for a final fabrication. To obtain a sharp impression, common pins were cut about three-sixteenths or a quarter of an inch below the head, depending on the depth of the pin hole (Fig. 2, top left). The ends were smoothed, covered with a film of sticky wax, dipped in warm inlay wax and pumped up and down into the pin holes until they were firm yet could be removed without undue sticking. A pair of old cotton pliers ground to form grooves which firmly held the pins were used to work the pins into the holes. Figure 2, top right, shows the pins in place.

A piece of ordinary store string impregnated with 8 per cent zinc chloride was tied around the teeth to displace the gum tissue temporarily. The pins were cut to allow at least one eighth of an inch to extend from the tooth surface. This provided sufficient bulk of alginate to prevent the pin head from tearing through. The strings were then removed from the teeth. A saliva ejector was placed in the mouth and a cotton roll inserted under the upper lip. The cotton roll eliminated a severe labial undercut which might have torn the delicate cavity margins of the impression. While this was being done, the abutment teeth were dried and alginate was painted rapidly in the grooves and around the pins with a small brush.

The assistant had previously selected and prepared a tray filled with alginate which was quickly pressed to position. Controlled impression depth was assured by the use of wax stops in the floor of the tray. The wax stops also provided stability of the impression during gelation of the alginate. Care was taken not to remove the impression too soon since this would allow the pins to tear through the alginate. When set, the impression was removed with a snap in the direction of the long axes of the teeth. The material

1. Tylman, S. D. Crown and bridge prosthesis, ed. 2. St. Louis, C. V. Mosby Co., 1947, p. 349.

resists tearing better if removed suddenly. Sharp clear margins were obtained in the impression and it was washed and dried of free surface moisture by air blasts (Fig. 2, bottom).

The pin devised by Dr. Spiro was used to facilitate the pattern carving. The wings of this pin were inserted into the labiogingival and linguogingival margins of the impression of the teeth which contacted the abutment teeth (Fig. 3, top). This allowed a single pouring of stone. When set, these teeth were removable. A thin blade was placed between the wings of the pin which made a clean fracture at the gingival margin of the tooth. The tube remaining in the body of the cast received the pin for replacing the tooth. This feature gave access to the abutment teeth and simplified the wax carving on the model (Fig. 3, bottom). These pins were made by using orthodontic tubing and .040 gage wire.

The impression thus prepared was then poured by vibrating thick masses of stone the size of a large match head over the lingual surface of the abutment teeth. The impression was rotated so as to control the flow of the stone in thin layers and thus avoid air traps. A very heavy mix of stone was used and care was exercised in order to insure that the impression would not be over-vibrated. Over-vibration would have driven the water to the surfaces giving the cast a chalky soft surface. When filled, the impression was placed in a humidor. After completely setting, the casts were removed from the impressions, trimmed and placed on a stand in a pan. The melted petrolatum, which was in the bottom of the pan, had a temperature of 190° F. Care was taken not to overheat the petrolatum since temperatures higher than 190° F. would dehydrate the model and if carried too high might cause the petrolatum to flash.

The models were basted with a brush, charged with the petrolatum, three or four times over a period of 20 minutes. The excess petrolatum was shaken off the

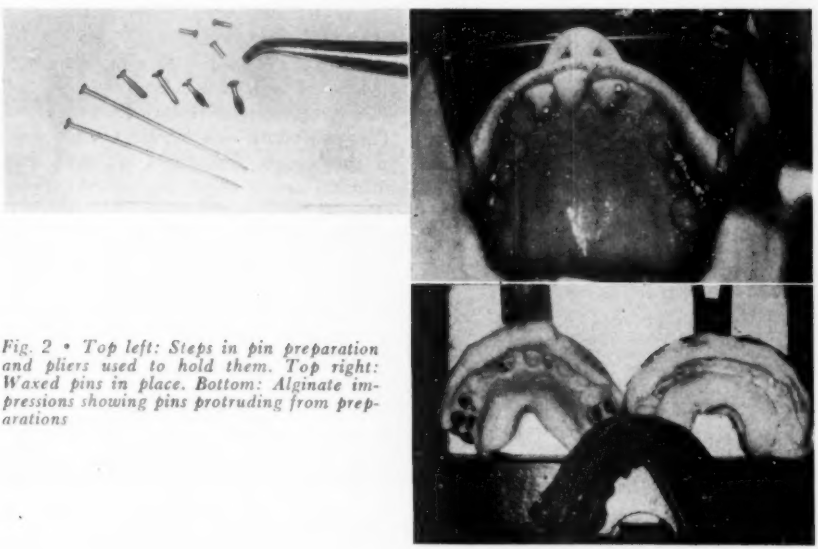

Fig. 2 • Top left: Steps in pin preparation and pliers used to hold them. Top right: Waxed pins in place. Bottom: Alginate impressions showing pins protruding from preparations

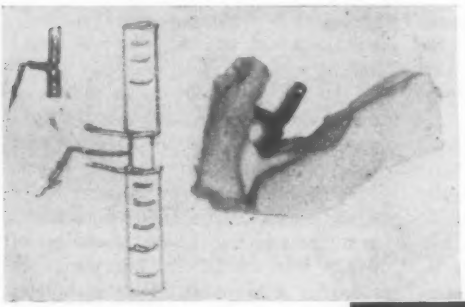

Fig. 3 • Top: Enlarged drawing of the Spiro pin in the impression.

Bottom: Model with tooth adjacent to the abutment tooth removed to facilitate carving

models and more of it was removed with a cloth and blasts of air. Two small inexpensive brushes were used. First, the model was brushed and then the petrolatum was removed from the brush by wiping it on a towel. The second brush was used to polish the model further. When this was completed, the models had a polished tempered surface from which wax patterns were readily drawn. With the models articulated, the retainers were carved. T bands filled with warm inlay wax were partially and repeatedly impressed over the abutment teeth until the wax completely filled and covered them. This procedure was similar to that used in the mouth for direct patterns, but afforded access which facilitated carving (Fig. 4).

Fig. 4 • Pattern carving on model using T bands

The patterns were sprued, invested and cast in extra hard gold. The sprues were not removed until the castings were tried on the natural teeth. After they were removed, the fit, bite and contact were adjusted, and a wax bite was taken (Fig. 5, left).

A final impression, with the retainers in place, was made. What I call a retainer stabilizer was used to eliminate the use of plaster and to get an impression in one piece. This stabilizer consisted of tubing and .040 gage wire and sheet

copper. It had been fitted previously to the abutment teeth of the duplicate model. The inlays in place were slightly lubricated and a small amount of filling porcelain was put in the stabilizer. This was carried to place over the abutment teeth. When the porcelain had set, the tray, filled with alginate, was carried to place over the stabilizer and teeth (Fig. 5, right). The stabilizer and porcelain were embedded in the impression. This provided a hard unyielding foundation into which the inlays were accurately placed. They were luted with sticky wax since a stone model was to be poured (Fig. 6, left). The retainers were antifluxed and the model was poured in low fusing metal (Fig. 6, right).

Many operators avoid the use of pin pontics because of the difficulty of replacement in case of breakage. However, building a harmonious relationship in all mandibular excursions not only prevents breakage but helps to eliminate undue biological damage.[2, 3] Because of the lack of bulk in both the metallic structure and the porcelain, care was used in pontic selection to avoid breakage, poor esthetics and faulty hygiene.[4] A pin pontic with a porcelain saddle was ground in and the backing carved, invested and cast. The

2. Faust, H. E. Anterior fixed bridgework. J. Missouri D. A. 28:355 (Oct.) 1948.

3. Schuyler, C. H. Correction of occlusal disharmony of the natural dentition. New York D. J. 13:445 (Oct.) 1947.

4. Skinner, E. W. Acrylic resins: an appraisal of their use in dentistry. J.A.D.A. 39:261 (Sept.) 1949.

Fig. 5 • Left: Sprues removed and inlays in place on natural teeth. Right: Retainer stabilizer in place over inlays

Fig. 6 • Left: Impression with inlays set in stabilizers. Right: Metal model with inlays and pontic in place

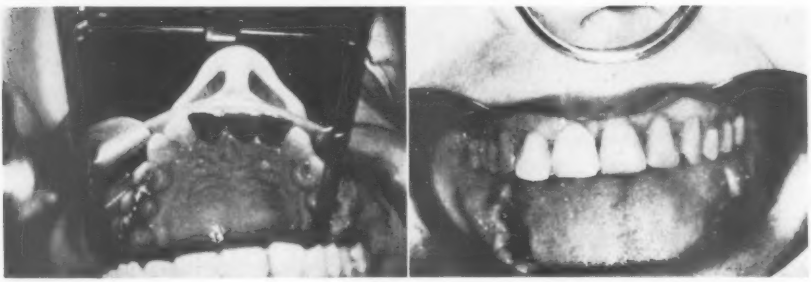

Fig. 7 • Left: Lingual view of immediate bridge. Right: Mouth of patient six weeks after extraction

pontic and backing were then aligned with the retainers and the cast backing soldered to the retainers. The fabricated bridge was smoothed, heat-treated in the furnace and polished. The root tip was glazed and the bridge was ready to set temporarily. At the patient's next visit, the right central incisor was extracted. A small piece of absorbable cellulose was placed in the socket to hasten clotting. Since resorption is unpredictable, the bridge and pontic were temporarily set, using an exceedingly thin mix of eugenol-zinc oxide. The saddle was made to conform to the ridge shape so there would be no encroachment on the bone or soft tissue by the pontic (Fig. 7, left). The occlusion was checked and the patient advised to return in a few days for any adjustment that would be needed or to report any loosening of the temporarily cemented bridge. A period of six weeks elapsed before final cementation (Fig. 7, right).

When a healthy well-healed ridge was evident, and in the opinion of the operator enough time had elapsed, the bridge was removed, cleaned and set with cement.

An indirect technic has been described which may be useful to the general practitioner who wishes to use alginate to make patterns.

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Scientific Records • We must expect inferior science from those who cannot work at the great research centers, until mechanisms are developed to insure that every scientist, no matter where he may be, may have access to the record of science to the full extent to which it can contribute to his investigations. *R. R. Shaw, Science 108:148, 1948.*

Diagnosis and correction of occlusal disharmonies in preparation for fixed restorations

Ernest B. Nuttall, D.D.S., Baltimore

The need for an adequate diagnosis has always existed in dentistry. Admitting that operations by the early dentists were generally limited to those services which attempted to relieve pain, it was necessary for them to locate the involved tooth or teeth. The crude appliances constructed for the replacement of teeth likewise required diagnostic considerations. As dental treatment evolved from a secret art to a more scientific procedure the importance of a background in the biological sciences was realized. Although the early textbooks and the literature stressed the mechanical aspects and were concerned largely with methods of rendering dental services, the biological considerations were not totally overlooked. At the beginning of the twentieth century George Evans, Prothero and Goslee pointed out the importance of considering physiological factors, occlusion and the distribution of forces of mastication in diagnosing conditions requiring crown and bridge prosthesis.

This appreciation of the importance of diagnosis by many members of the profession undoubtedly was responsible for the advancement in diagnostic procedure and the development of diagnostic aids. It is certain that the present concept is the result of an evolutionary process and is in no sense new. Therefore, the failure to diagnose dental conditions properly is probably owing to the fact that it is time consuming and appears to be relatively nonprofitable. It may also be pointed out that too many dental services probably are influenced greatly by preconceived opinions of the operator and the patient. For example, if a tooth is carious and not extremely important esthetically it is removed regardless of its possible importance in the dental arch. The results of such treatment frequently complicate restorative procedures and the extraction is regretted later by both the dentist and the patient. The time required to establish a mutual understanding of the dental problem is surely justified if the primary objective of oral health is to be achieved.

The value of any dental service depends on the accuracy of the diagnosis and the therapeutic quality of the treatment. This is especially true in fixed dental restorations which are mechanically constructed, yet must be compatible with the biologic limitations of the tissues involved. Fixed dental restorations include all of the curative remedies employed in

Presented before the Section on Operative Dentistry and the Section on Partial Denture Prosthesis, ninety-second annual session of the American Dental Association, Washington, D. C., October 16, 1951.

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restoring individual teeth and in replacing one or more teeth. The simplest one-surface restoration, complete and partial veneer crowns and multiple-unit fixed bridges are fixed dental restorations.

It is generally accepted that a background of knowledge upon which diagnostic and treatment procedures depend is the most important prerequisite of a practitioner of dentistry. The proper utilization of this foundation is the only means of providing the necessary treatment for a patient. Too frequently a dental service is referred to as "poor dentistry." What constitutes poor dentistry? Does it mean the rendering of an improper service, or the inferior execution of the indicated service? The dentistry may have emanated from the fingers rather than from the mind. There are many examples of well executed dental restorations which should not have been constructed at all. The operator's lack of training in the biological concepts would account for his failure to diagnose properly the oral conditions. The result is that an excellently executed technical service is poor dentistry. On the other hand, an amalgam restoration not having good anatomic form and not polished may be judged poor dentistry by superficial observation; yet the preparation is excellent, proper pulp protection is maintained, the amalgam is well condensed and good efficient function is restored. Contrast this service with a beautifully carved and polished amalgam restoration in a tooth in which all of the caries was not removed; on superficial observation the result would be judged good dentistry. The quality of the dental service is sometimes based on the appearance of materials. For example, the use of clear acrylic in appliances has merit because it has a clean appearance and satisfies esthetic demands. Good dentistry is not measured by the beauty and fascinating intricacy of design of the appliance. Therefore, a valid opinion of the type of dentistry cannot be obtained from its appearance. Good dentistry is the restoration of function and the preservation of oral health.

IMPORTANCE OF CORRECT DIAGNOSIS

It is the purpose of this paper to discuss the relation of diagnosis and treatment to the correction of occlusal disharmonies before fixed dental restorations are constructed. The concept is not new and is presented here from the point of view of clinical observation. Undoubtedly it has been the unhappy experience of most practitioners to view many dental services which have been rendered without proper observation of the facts upon which the treatment should have been based. Why this condition should exist in the practice of dentistry cannot be fully explained.

It is highly possible that the following factors have exerted some influence. In the first place, dentistry has a heritage in this respect which is difficult to overcome. From the time that the first dental services were rendered down to the present, most patients have been interested only in the involved tooth. This attitude requires the dentist to direct his attention to a particular area rather than to a careful observation of the entire mouth. The patient, being less interested in a comprehensive diagnosis than in the result of the treatment of the immediate trouble, has caused the perpetuation of this method. Again many patients often misinterpret efforts to render a comprehensive dental service. It then requires much time to educate them properly to the soundness of such diagnostic and treatment procedures.

It is gratifying to note the advancement in dentistry with respect to the place that oral diagnosis occupies in both dental education and dental practice. At last services are rendered to patients rather than to individual teeth. If the diagnostic data are properly organized, analyzed and

interpreted, it is certain that the treatment which follows will be based on careful observation of the individual's needs rather than on some preconceived opinion. This will do much to eliminate the distasteful reference to many oral services as poor dentistry.

It is an error for any dental practitioner to think that the time consumed in rendering a thorough diagnosis is unnecessary and wasted. A well planned and executed treatment is a means of conserving time for the dentist and of providing a better service for the patient. These results can be accomplished in a practical and profitable manner. The elaborate systems of diagnosis often tend to discourage a practitioner from giving this phase of dental service for economic reasons. Emphasis should be placed on an orderly procedure which follows a familiar and organized routine of oral examination. This will eliminate loss of time and furnish completely accurate information to be used in planning the treatment.

ESSENTIALS OF COMPLETE DIAGNOSIS

The essentials for a complete oral diagnosis are clinical examination, roentgenographic examination, vitality tests and study casts.

The clinical examination is always made, since the dentist must look into a mouth to determine the dental needs. However, frequently it is superficially executed and the existing conditions are not correctly evaluated. This is particularly true in considering removable appliances as a means of replacing missing teeth to the extent that the operator sees only edentulous spaces. The usual explanation offered for this approach is that it makes possible a more effective distribution of dental service in a busy practice. The validity of this reasoning is, of course, questionable and certainly does not justify a cursory examination. The important consideration is to obtain worth-while information of oral conditions rather than to rush into treatment. The service then rendered is based on a sound foundation of facts which is necessary in choosing the most favorable method of restoration. The patient's economic status and desire for certain types of dentistry are factors that must be considered. A compromise in the method of treatment may be necessary for individuals of limited means; however, the quality of the service must not be altered.

The clinical examination is performed by visual and palpable means. The general oral conditions, the hygiene of the mouth and the care given the mouth by the patient are noted. The predispositions toward periodontal disease, pocket development, loss of proximal contact, food impaction and caries susceptibility are ascertained. The number, size and location of the edentulous areas are checked. The occlusal relationship of the remaining teeth and the altered position of the individual teeth are most important details to be observed in the examination. In examining the occlusion of the teeth, the relationships in centric and excentric positions should be noted. The soft tissues should be examined and abnormal conditions evaluated. Patients with manifestations of some systemic disease should be referred to a physician for consultation.

A complete roentgenographic study is probably the most important examination. It is a means of determining healthy or pathologic conditions existing in the teeth and the supporting structures. The presence of carious lesions, existing restorations, size and shape of pulp chamber and the number and shape of the roots are shown. Unerupted teeth, impacted teeth, root tips and retained foreign substances can be located. The health of the periodontal membrane, lamina dura and nonvital teeth is studied. The quality and quantity of the remaining alveolar bone are noted.

Many factors cause the resorption of alveolar bone and formation of periodon-

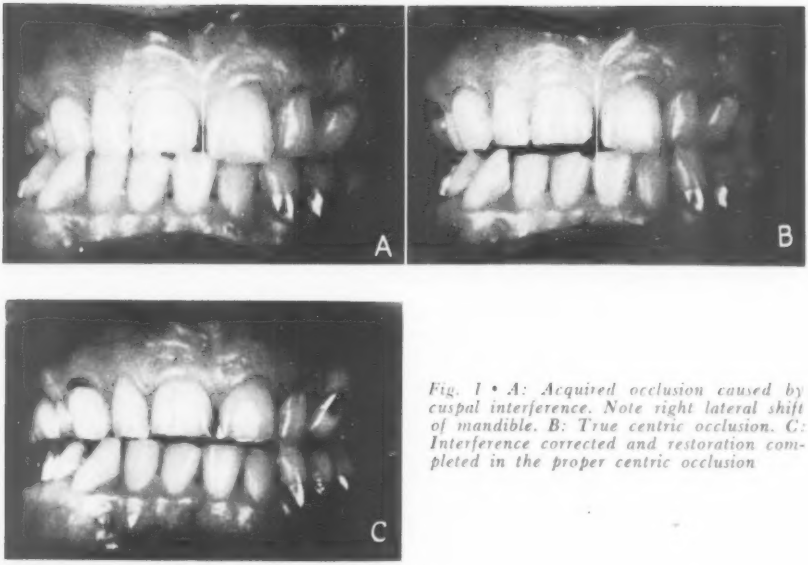

Fig. 1 • A: Acquired occlusion caused by cuspal interference. Note right lateral shift of mandible. B: True centric occlusion. C: Interference corrected and restoration completed in the proper centric occlusion

tal pockets. Among those factors are occlusal trauma, premature loss of teeth, absence of proximal contact, gingivitis, periodontitis, periodontosis and habits, such as bruxism.

In conjunction with the roentgenographic examination, questionable teeth should be tested for vitality by the electric pulp tester, cylinders of ice, or heat. The degree of sensitiveness of the pulp of a tooth will indicate its vitality, the presence of secondary dentin, the state of hyperemia and the stage of inflammation. Teeth that are well matured or have considerable secondary dentin respond slowly to electric and thermal tests. Pulps in a state of hyperemia are extremely sensitive to thermal change and respond to a low voltage with the electric pulp tester. Heat and cold usually cause sensitiveness in the early state of inflammation. As the inflammatory process develops, heat causes pain and cold relieves pain. The pulp in an inflamed condition responds to a lower amount of electric current, and it requires a greater amount to cause irritation as degeneration progresses. The electric pulp test should not produce a response in a pulpless tooth. No method of testing pulp vitality is completely dependable, and good judgment must be exercised constantly.

The use of study casts provides a more accurate means of determining the occlusal relationship. The occlusal disharmony which presently exists can be more easily studied. The position of possible abutment teeth can be checked with a surveyor to determine the axis of preparation. Preparations may be made on these casts to serve as a guide for procedures in the mouth. The study casts may be used in the construction of a temporary appliance to replace teeth which must be extracted. This service is especially indicated when anterior teeth are involved.

EVALUATION OF DATA

After the diagnostic data have been obtained, they are organized, analyzed and used in planning the treatment. It is the proper evaluation of this information by the practitioner that will determine the kind of dental service the patient will receive. There are many cases which appear basically the same, but each patient presents a different problem and must be considered individually.

Specific data obtained from a careful diagnosis relating to the correction of occlusal disharmonies are considered here. The entire mouth is considered clinically and roentgenographically, noting the effects of occlusal trauma and the presence of facets on the occlusal, incisal and lingual surfaces of the study casts. The disharmonies most frequently needing correction are interfering cusps, altered position of teeth caused by the presence of edentulous areas, malpositioned teeth and developmental imbalances.

Interfering cusps may exist in a mouth which appears to satisfy all requirements of individual normalcy of occlusion. The condition, of course, becomes more aggravated in mouths having malocclusion caused by developmental or acquired factors. Among the developmental factors responsible for cuspal interference are disharmonies in the size and relation of the arches and in the size and position of teeth and oligodontia. The acquired factors are the result of excessive attrition, caries, premature loss of teeth and faulty restorations. Whatever the cause of interference, the cusps should be corrected

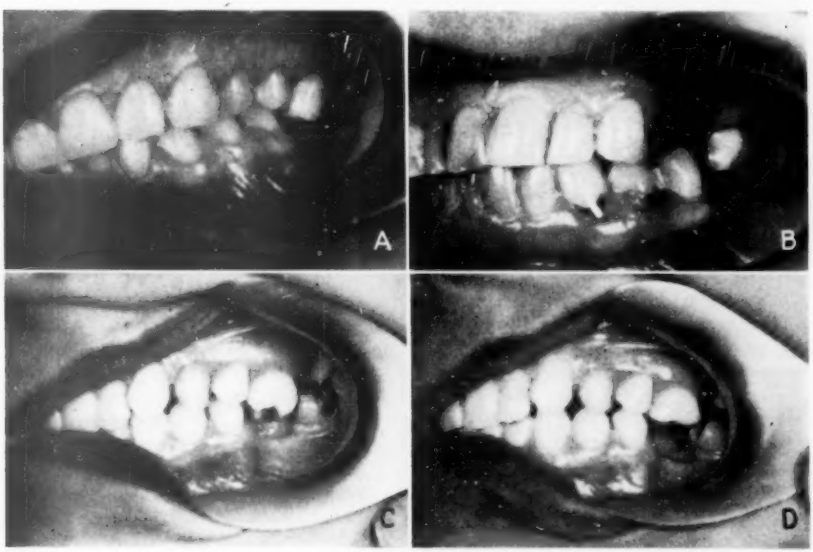

Fig. 2 • A: Extruded tooth showing increased length of clinical crown. Extrusion accentuated by the action of the anterior component of force. B: Extruded teeth showing little change in length of clinical crowns. Bone has formed as the teeth erupted. Anterior component of force in this area is not acting because of lower edentulous space. C, D: Extruded tooth corrected by occlusal reduction prior to construction of lower fixed bridge

before even the simplest restoration is made, especially if a more extensive restoration is contemplated. This correction will prevent an inequitable distribution of masticatory forces on the teeth and restoration. The elimination of shearing movements of the mandible will reduce attrition and possibly prevent injury to the temporomandibular articulation (Fig. 1).

Interfering cusps may be diagnosed by clinical observation of the occlusal relations of the teeth as they articulate. The diagnosis should be supplemented by information obtained from the study casts and roentgenographic examination. It is often possible to detect cusp interference by placing a finger against individual teeth as the patient occludes in various positions. Particular attention should be given the complaints of soreness in individual teeth. Carefully observe abraded areas, occlusal wear and the degree of mobility of all teeth.

The location of the area of interference is accomplished by means of a thin wafer of soft wax covering the occlusal surfaces of a limited number of teeth. Black carding or boxing wax is excellent for this purpose because of the contrast in color and the properties of manipulation. It is easily squeezed or rolled into the desired thickness and will adhere to the dried occlusal surfaces. Each position of occlusal relationship is checked individually and the perforations in the wax produced during occlusal contact are studied carefully. Areas are marked with indelible pencil. Slight adjustments of the cusps by selective grinding may be all that is necessary to eliminate excessive force on individual teeth. The free gliding of the

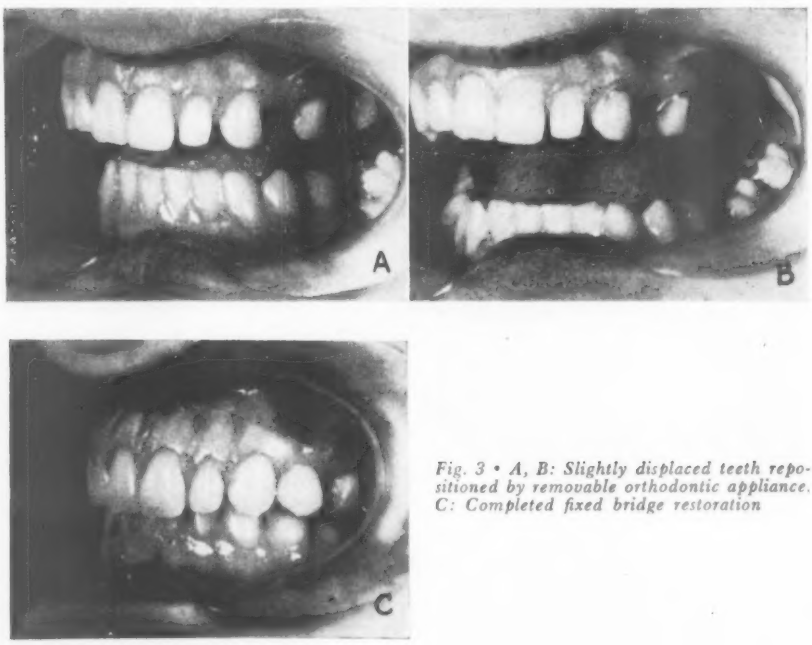

Fig. 3 • A, B: Slightly displaced teeth repositioned by removable orthodontic appliance. C: Completed fixed bridge restoration

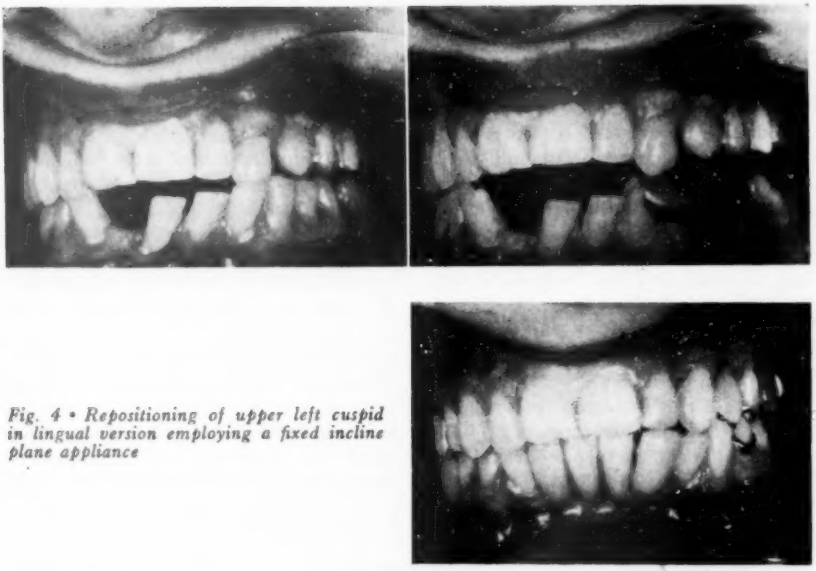

Fig. 4 • Repositioning of upper left cuspid in lingual version employing a fixed incline plane appliance

teeth in occlusal contact relations is essential to the maintenance of health of supporting tissues. The correction of interference becomes an increasingly important factor in older patients as tissue resistance is reduced.

It is also possible to locate the overloaded areas by means of carbon paper; however, care must be exercised in using this method. The patient must be trained to contact the teeth in one position and avoid any excursive movement. The mouth is opened 2 to 3 mm., and with carbon paper in position closure is repeated several times in a tapping manner. At best it is difficult to interpret the carbon marks appearing on the occlusal surfaces. The use of articulating paper has the greatest merit in checking centric occlusion in the location of high spots on restorations.

Indiscriminate reduction of the cusps of natural teeth should be avoided and a surface that will affect the vertical relation should never be ground. A slight reduction of interfering cusps often contributes greatly to the comfort of the patient and prevents injury to the supporting tissues.

Conservative removal of the sharp angles of the occlusal and incisal surfaces of teeth which have been worn irregularly prevents fracture of these thin edges and provides comfort for the tongue and cheeks. It is possible to reduce an excessive overbite by judicious grinding of the incisal edges of the upper and lower anterior teeth. Too frequently the grinding procedure is limited to the lower incisors. It is not possible to eliminate all incisal interference in the protrusion relation of most natural dentitions; however, much good can be accomplished.

In the more involved cases of occlusal disharmony, it is advisable to transfer the study casts to an anatomic articulator so that cusp interference can be more accurately observed during functional

movements. The approximate amount of relief necessary to establish good functional relation and afford freedom of movement can be determined. The articulation of study casts to reproduce the mandibular movements is always necessary in diagnosing and in planning treatment that requires a change in the existing vertical relationship.

Altered position of teeth is one of the greatest factors in complicating restorative procedures. Teeth extruded beyond the plane of occlusion because of the presence of an edentulous area in the opposing arch must be reduced occlusally to establish a more favorable occlusal plane (Fig. 2). If this reduction cannot be accomplished without affecting the vitality of the tooth or teeth, then root canal therapy or extraction is indicated. If extraction is necessary, a bridge must be constructed to replace the lost tooth in that arch. The extrusion of teeth occurs in both arches; however, it is more frequently observed in the upper arch. The greatest movement occlusally takes place in the upper arch when there is a tooth remaining distal to the lower edentulous area. The bone level often remains comparatively constant, while the length of the clinical crowns of the extruded teeth is greatly increased. These conditions suggest that in addition to the eruptive process the anterior component of force may be a factor in causing the excessive extrusion (Fig. 2, A). It is sometimes noted clinically that in those cases in which no tooth is remaining distal to the lower edentulous area, the opposing teeth and alveolar bone move occlusally. There is little or no

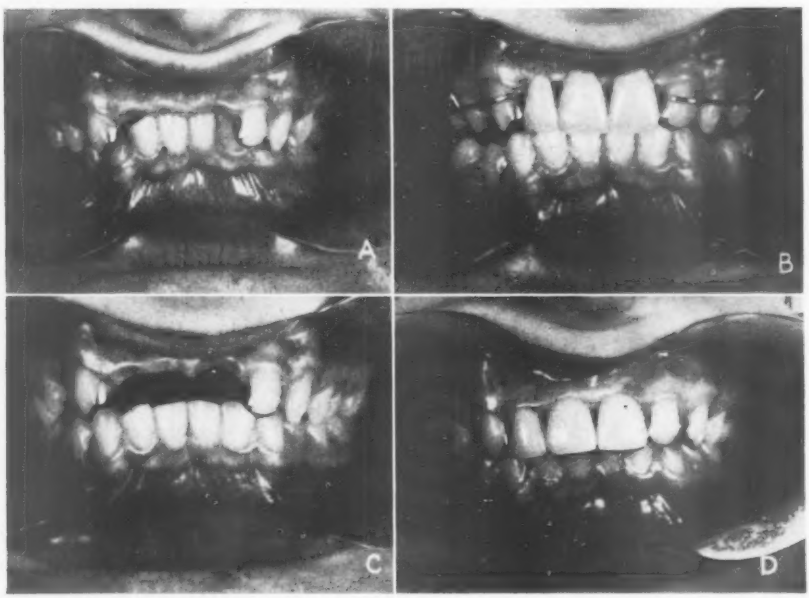

Fig. 5 • A: Original fixed bridge failed prior to orthodontic treatment. B: Reduction of deep bite using a bite plane appliance. C: Result of four and a half months of treatment. D: Fixed bridge restoration using double abutment support on left side

change in the length of clinical crowns of the teeth, since bone is formed as the teeth erupt. The presence of the latter condition makes treatment difficult and in many instances extraction is indicated (Fig. 2, B).

Rotated teeth, in many instances, can be corrected with complete crown restorations. If their location in the arch and the quality of tooth structure permit, it is often possible to reshape teeth with abrasive instruments. A great many rotated teeth require orthodontic treatment for correction.

Tipped teeth are difficult to reposition and are generally restored to function and good anatomic contour with complete crowns. Where the vertical deviation is slight, resulting in loss of proximal contact, the inlay restoration may be employed. This generally requires reduction of the natural cusps and the complete coverage of the occlusal surface with metal. Tipped teeth used as abutment supports always require more careful attention in the design of the restoration and in the readjustment of the direction of the occlusal forces.

Teeth slightly drifted are easily repositioned, and proximal contact is easily re-established by the use of removable orthodontic appliances (Fig. 3). In most of these cases the teeth are moved without interfering with the occlusal relationship. The vertical relation of these teeth accounts for the practical aspects of such treatment as compared with the need of occlusal clearance in attempting to reposition tipped teeth. A favorable occlusal plane of the restoration, which resists the forces of mastication in the direction of the long axis of the abutment teeth, is maintained.

The value of orthodontic services in

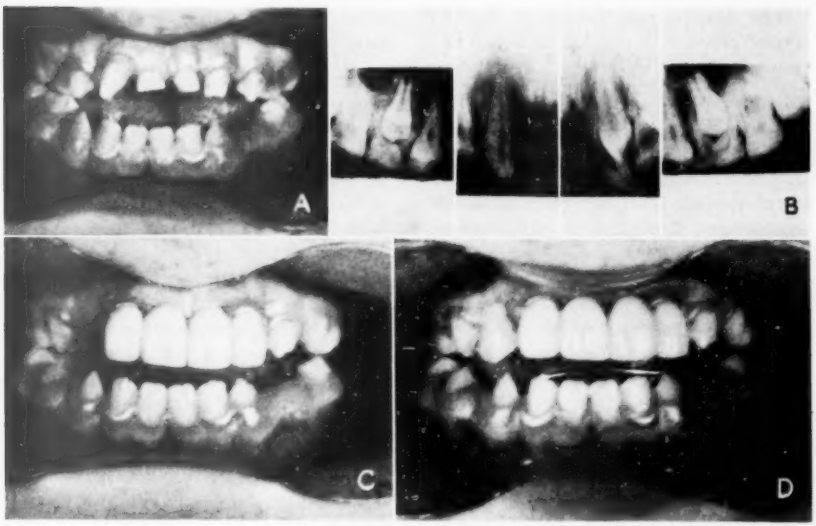

Fig. 6 • A, B: Patient 11 years of age, with open bite, oligodontia and tongue habit. C: Fixed bridge restoration constructed to reduce anterior inter-arch space. D: Orthodontic appliance with attached tooth and tongue guard replacing upper right cuspid. Further treatment will be required

correcting malpositioned teeth prior to the construction of a restoration should be emphasized. Many individual teeth which are in lingual occlusion can be quickly repositioned (Fig. 4). Individual teeth that are in labial or buccal position likewise may be repositioned and retained in place by fixed restorations.

The developmental imbalances such as the deep overbite, cross bite and open bite require orthodontic services (Fig. 5 and 6). Many cases with deep overbite present difficult problems of restoration prior to correction by orthodontics. It is difficult to determine the causes of developmental disharmonies in occlusion. There are undoubtedly many factors which affect the growth and development of the individual, especially in the facial region, such as heredity, intermixing of races, environment and habits. Much excellent work has been done in these investigations; however, the results seem to point to the need for more study and an analysis of existing data.

The general practitioner of dentistry is confronted with conditions which have resulted from improper development, habit, neglect, premature loss of teeth and many other acquired factors. However, occlusion remains the foundation of the practice of dentistry. The conception of dynamic occlusion is a paramount concern to us in all dental restorations. There are constant changes occurring in occlusal relationship which require continual rechecking. The omission of this procedure may partially explain the failure of some restorations which when initially rendered seemed to satisfy all of the requirements.

In the placement of a simple restoration the failure to correct occlusal disharmonies would result in minor harmful effects. Of course, preventive aspects of the service depend on the early correction of these disharmonies. A correction of these disharmonies becomes imperative in extensive restorations. This is especially true in the preparation of the mouth with fixed restorations prior to the construction of a removable partial denture. Disregarding this vital procedure is unwittingly perpetuating the idea that dentistry is a strictly mechanical service.

618 West Lombard Street

Value of Experiment • It took the world from the day of its creation to the time of the sixteenth century to raise a doubting Thomas of sufficient mental strength and courage to state that questions were answered not by authority, but by experiment. *C. H. Mayo, "Tomorrow's Education Seen by Dr. Mayo," Northwestern University Alumni News 10:17, July, 1931.*

Removable pontics for fixed bridgework

Saul R. Kaye, D.D.S., New York

The ideal fixed bridge has not yet been devised. Although modern types of fixed bridges in general use today have many redeeming features, they all possess one or more undesirable characteristics. The shortcomings of the pontic portion of a fixed bridge will be discussed. Also methods of construction which will make it possible to remove the pontic, or a good portion thereof, at the will of the operator or patient and which will improve the esthetics by the elimination of gold occlusal surfaces without detriment to the tissues or to the ability of the restoration to withstand masticatory stresses.

The creation of a removable pontic as a part of a fixed bridge has interested dentists for a long time. Every dentist who has had much experience with fixed bridgework probably has felt the urge to remove the pontic after it has been in place for some length of time.

In the past, a familiar form of construction was the pontic with a vertical pin that screwed down through the occlusal surface. To remove the pontic, one needed only to unscrew and remove the pin. However, this pontic was not practical either to construct or to maintain.

The Chayes type of removable pontic bridge is still in use today but it is not very common. Adequate retention for this type of bridge requires the preparation of wide seated cavities in the abutment teeth. Unless these teeth already have large cavities or fillings their preparation will entail extensive tooth destruction. Also, the construction requires at least two precision attachments which must be absolutely parallel on all their axes. This is a long and costly procedure.

The advent of acrylics has improved the esthetics of fixed bridges and it did not take long for acrylic pontics to become popular. They are supported with a metal ladder running through the acrylic mass from abutment to abutment and are soldered on both ends. From an esthetic viewpoint they are ideal. However, they are not properly supported and cannot withstand the stresses and strains of mastication. The disastrous effect of breaking this type of pontic is obvious. The entire restoration must be removed and reconstructed.

A PRACTICAL REMOVABLE PONTIC

A bridge with a removable pontic which is simple to construct and relatively inexpensive will be described. It requires no precision parallelism and the resulting esthetics approaches the ideal without creating a problem of breakage (Fig. 1, above). The inlay construction required is the same as that required in any well designed and well constructed inlay bridge.

The pontic is made removable by the use of a frictional type of attachment. Any of the Chayes or Brown-Sorenson type of attachments are satisfactory. The number and size of the attachments used depend on the corresponding number and size of the spaces, usually one attachment for each pontic. Often in the

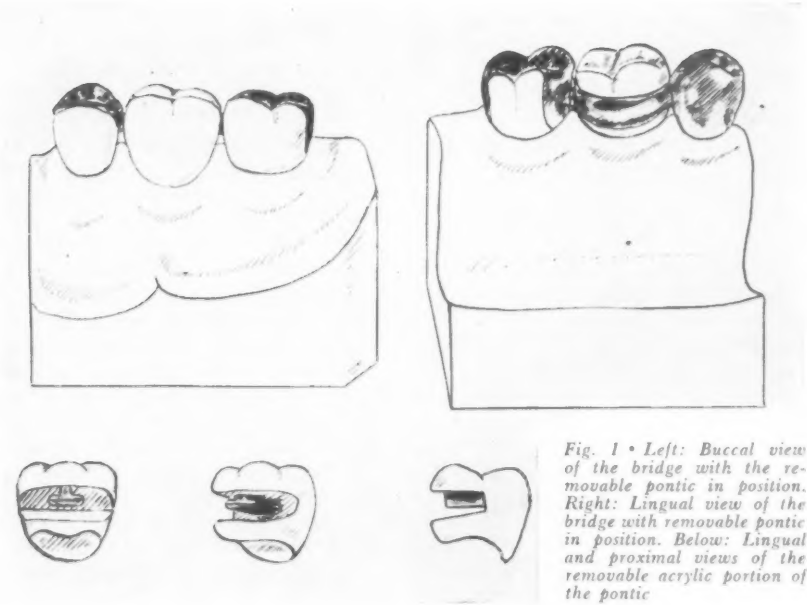

Fig. 1 • Left: Buccal view of the bridge with the removable pontic in position. Right: Lingual view of the bridge with removable pontic in position. Below: Lingual and proximal views of the removable acrylic portion of the pontic

case of two small pontic spaces, one large attachment may be used. The greater part of the pontic is solid and is covered by acrylic on the occlusal, buccal and tissue surfaces (Fig. 1, below). In short bite cases it is necessary to sacrifice some esthetics and use a gold occlusal surface.

There are two sections to the pontic: (1) a fixed section, or the pontic matrix, and (2) a removable section, or the acrylic portion.

The pontic matrix consists of an almost flat, horizontal casting soldered between the abutments (Fig. 2, left). The casting is flat or curved to correspond to the curvature of the bite. It should be centered properly to allow sufficient clearance for the occlusal and tissue surfaces of the acrylic portion. The lingual surface of the casting should be properly contoured (Fig. 2, right). The lingual area is the only one where there is any visible gold. Around the lingual rim of the casting, above and below, there is a slight lip or apron to give it a good finishing edge against the removable section. The buccolingual width of the thick section usually is not greater than two thirds of the same width of the whole pontic. Wherever possible, the buccal edge should be concave so as to permit a greater bulk of acrylic material on the buccoocclusal aspect of the pontic.

The removable acrylic section of the pontic is much simpler to construct. It consists of a solid mass of acrylic material covering all except the lingual sides of the fixed portion (Fig. 1). The key part of the precision attachment is processed within the acrylic with its open end toward the lingual surface. Emphasis is placed on having the key portion with its open end toward the lingual surface as this allows the open end, when seated, to fit into the deep end of the keyway. This

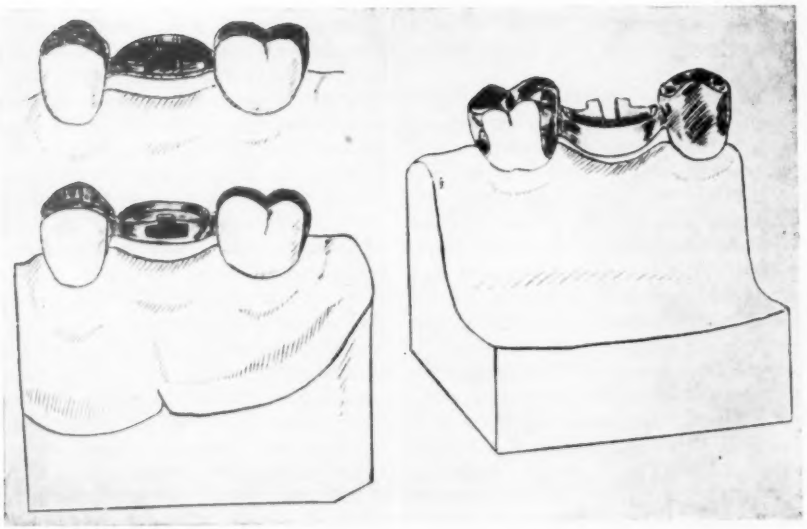

Fig. 2 • Left, above: The pontic matrix soldered into position between the abutments; below: the pontic matrix with the keyway portion of the precision attachment soldered into position. Right: Lingual view of Figure 2, left, below

is the reverse of the usual way of constructing precision attachments, but it is necessary in this design in order to regulate the retention of the key within the keyway. The attachments can be adjusted to any degree of tightness so that the key slides on and off the keyway section at will with the degree of resistance desired (Fig. 3).

TECHNIC OF CONSTRUCTION

The first step is to choose the proper attachment. As mentioned earlier, the width of the attachment depends on the space involved. It is always safest to use the widest attachment the space will accommodate. The next step is the wax pattern for the pontic matrix (Fig. 4, A). A fine grade of thick sheet wax is used. A flat strip is cut to fit horizontally from abutment to abutment, and about two thirds of the pontic space buccolingually. The lingual aspect of the wax is trimmed to a close approximation of the lingual curvature. The lingual apron of the pattern is made either by beading the edges with wax, or by adding a vertical strip of thin gage wax around the lingual edge and luting it. A box is cut out of the wax pattern sufficiently large to accommodate the attachment. This is done by warming the attachment, or anything of similar size, placing it in its position in the wax and gently withdrawing it before it cools. The pattern is sprued on the lingual side and cast (Fig. 4, B). The casting is shaped and trimmed to allow easy seating of the keyway part of the attachment. The pontic matrix is positioned and soldered to the abutments (Fig. 2, left, above). The keyway is then carefully soldered into position (Fig. 2, left, below, and Fig. 4, C). The sequence of the last two steps is important in order to prevent excessive contraction of the

keyway. The pontic matrix is now finished and polished (Fig. 2, left, below, and 2, right.)

The next step is to insert the key portion of the attachment into the keyway (Fig. 4, D). It must be worked in and out several times so that it is not too snug. With the bridge on the model, the remaining portion of the pontic is carved in white wax (Fig. 4, E). The entire bridge is removed from the model and the pontic processed in acrylic. If the pontic matrix is finished and smoothed properly the wax need not be removed, but can be processed directly against the pontic matrix and later separated without difficulty. In processing, the key is automatically locked within the removable section (Fig. 1, below, and Fig. 4, F). The acrylic section is smoothed and polished and the bridge is completed.

Through this method a removable pontic is constructed, the saddle area of which does not impinge on the soft tissues. It also allows relatively free access to any portion of the tissue or proximal abutment surfaces. This is of prime importance in fixed bridgework. It has always been difficult to determine how much to relieve the saddle area. This is manifest in the number of patients with inflammation of the saddle area tissues. These tissues naturally are difficult to treat if the pontic cannot be removed. Circulation in these tissues tends to become stagnant with a resultant hypertrophy which may extend several millimeters up along the pontic. An obvious advantage in being able to remove the pontic is cleanliness. A well contoured bridge should not trap food, but it can and often does. Food pockets and traps may be caused by the poor position of abutment teeth. The feeling of a lack of cleanliness is always a mental hazard to the patient, and justifiably so.

It is often possible to reach the interproximal surfaces of the abutment teeth sufficiently so that complete removal of the entire bridge is unnecessary. Idiosyncrasies of tooth anatomy or positioning, in many instances, make it impossible to have the gingival margin of the inlay underneath the gum. In such instances

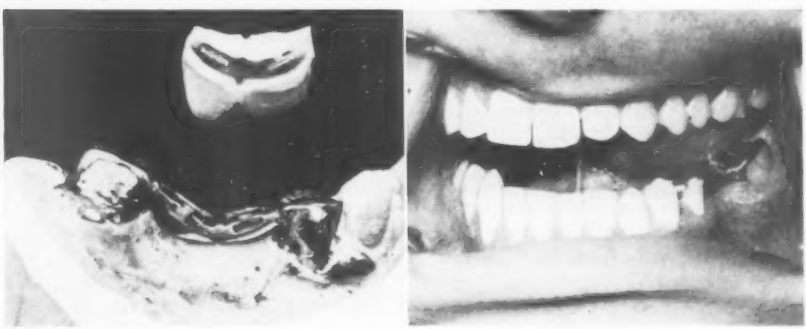

Fig. 3 • Left: Same bridge as shown in Figure 1 with the pontic removed and reversed to show its lingual aspect. Both pontic units were processed as one piece. The horizontal keyway crosspiece in this bridge was contoured to the curvature of the bite. Note the split end of the key attachment which is pointed lingually, making it easily accessible for adjustments. Right: A three unit restoration with the pontic removed. Note the ease of access to the interproximal regions of the abutment teeth. The tissues have sufficient freeway space to allow for cleanliness and congestion of the tissues is no longer a problem

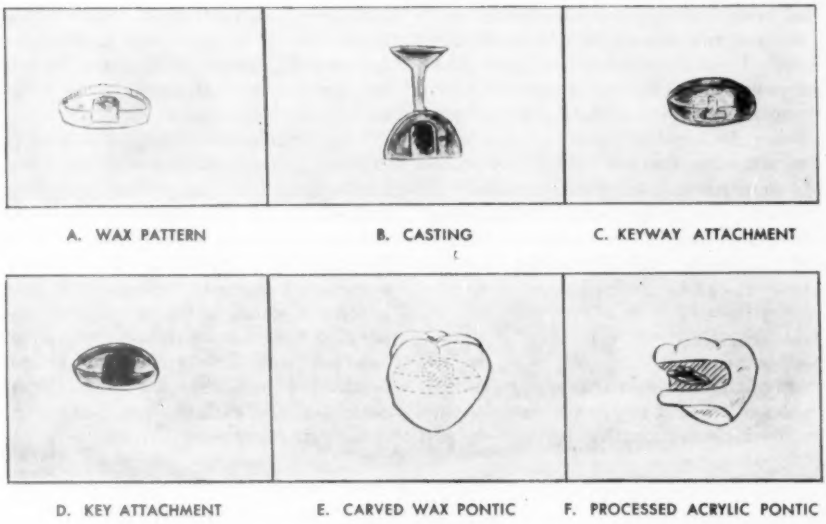

Fig. 4 • Six steps in the technic of construction

the interproximal portions of the teeth are subject to primary, not secondary, decay. The ability to excavate those portions properly will often mean the salvaging of the bridge.

ESTHETICS

How does a patient feel when a multiple unit restoration on the lower jaw of the replaceable pontic type is completed and he is asked to admire it? His esthetic sense is not pleased by the very evident long row of gold. Many dentists, in their desire to overcome this, resort to the tube tooth type of pontic with the porcelain cusps and gold saddle against the tissue. But results are frequently unsatisfactory. The porcelain type of tube tooth does not withstand the posterior stresses of mastication. Gold, however, is more irritating to the soft tissues than highly glazed porcelain when used in the saddle areas.

The use of acrylics in dentistry satisfies any esthetic requirement and the material is strong enough to withstand occlusal posterior stresses. But the key to the successful use of acrylics in bridgework lies in giving it proper support.

In the bridge described, the occlusal acrylic portion is supported at least two-thirds buccolingually and wholly mesiodistally by the flat pontic matrix. It is also partially boxed in by the lingual lipped extension of the pontic matrix (Fig. 1, right).

When acrylic is used on the buccal and occlusal surfaces and partially on the lingual surface, the esthetic aspect is pleasing. The importance of having a highly polished acrylic saddle surface is well recognized. It has a higher tissue tolerance than gold, and food will not adhere to it readily.

The problem of rapidly wearing acrylic occlusal surfaces is frequently encountered. This is overcome with this type

of bridge in two ways: (1) the worn occlusal surfaces can easily be replaced and (2) small metal stops can be placed on the occlusal surface by soldering them to the top surface of the key before processing the acrylic. These are also useful in removing the key during the process of construction. In instances where the bite is closed, the acrylic occlusal surface may have to be sacrificed in favor of a metallic one. The other desirable features can be retained.

SUMMARY

Although modern fixed bridgework enables the dentist to provide patients with remarkable restorative service, it still has many shortcomings. Primarily, these shortcomings are: (1) a tendency to collect food particles, (2) a tendency to impinge on the soft tissues and (3) an undesirable appearance.

These aspects are alleviated by the type of fixed bridge described in this paper. I have constructed 26 of these bridges for patients over a period of four years. No attempt was made to select patients with favorable bite conditions. The restorations have been checked periodically and, in some instances, the patients have been permitted to remove the pontic at their own free will. The results have proved satisfactory from the physiological, psychological and esthetic standpoints.

33 West Forty-second Street

Equilibration of the occlusion of natural dentition

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In 1922, F. A. Bricker[1] wrote: "One of the most important means of obtaining information concerning a main predisposing cause of periodontal disturbances of patients more than thirty-five years of age is a study of the surface wear on the teeth. The greatest percentage of periodontal disturbances at this age is caused, I believe, by improper lines of force produced upon the teeth during mastication, or rest; in other words, the force directed along the lines of least resistance causes trauma; interference with the capillary circulation causes lowered resistance in the traumatized area, and infection takes place by way of the circulation. During the period of lowered resistance the osteoclasts are stimulated and cause destruction of the bone." Herein lies a clue to the prevention of one of the principal causes of periodontal disturbances.

During mastication, the forces delivered to and through the teeth to the supporting structures sometimes reach 250 pounds. When there are premature contacts of the teeth during the static or the dynamic ranges of occlusion, those teeth receiving the initial contact will

1. Bricker, F. A. Use of models in the detection of abnormal surface wear on the teeth. J.N.D.A. 9:226 (March) 1922.

bear the brunt of the load of mastication. This will result in the breakdown of the supporting tissues. Those teeth that are not in proper function will have highly cancellous bone surrounding their roots because of disuse atrophy.[2-13]

When teeth have been abraded through mastication, the parabolic regions of the cusps are reduced to a flat-surface-to-flat-surface contact in occlusion. The teeth become "mashers" and tremendous amounts of force are necessary to triturate the food.[14]

In equilibration, or balancing of the occlusion, three main objectives must be kept in mind: (1) the load of mastication must be distributed to as many teeth as possible; (2) the forces of occlusion should be delivered so that they are borne as much as possible by the long axes of the teeth; (3) the surface-to-surface contact of flat cusps should be reduced to a point-to-point, or point-to-surface, contact in the range of occlusion so that the act of trituration will not need more force than the teeth are anatomically and physiologically designed to bear.[15]

Three basic methods, or a combination of these methods, can be utilized to provide a balanced occlusion. The first is orthodontic, the second is occlusal rehabilitation and the third is balancing or equilibration of the occlusion of the natural dentition by grinding.[16] The third method is within the scope of every operator.

Normal physiologic occlusion produces an equilibrium of forces. The teeth are subjected to two stresses singly or simultaneously:

1. Vertical stress: a force transmitted in the long axis of the teeth opposed by the shape of the roots of the teeth, the bone and the periodontium.

2. Horizontal stress: a force transmitted at right angles to the long axis of the teeth which is the most dangerous force because it produces a torque or turning effect on the periodontal membrane and alveolus.[17,18,19]

It must be kept in mind that the only rules for balancing that can be definitely laid down are rules that will apply to teeth that are in normal or nearly normal position. This type of occlusion is rarely found. It is extremely important to understand the over-all principles involved in "where to grind" and "where not to grind." Then the plan of operation can be decided for each case, rather than blindly following rules which may not apply in the particular case.[20]

There are two types of premature contacts: (1) vertical premature contact, which occurs when there is premature contact in centric relation and (2) horizontal premature contact, which occurs in the lateral or protrusive ranges of occlusion. The vertical premature con-

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tact in centric relation drives the tooth mesially or distally causing degenerative changes to take place in the bone mesially and distally because of the forces that are untenable physiologically.[11,21,22]

The horizontal type of premature contact is most dangerous. The tooth is driven laterally against the lamina dura by a force greater than the tissues were anatomically and physiologically designed to bear.[17,23-27]

Premature contacts usually result in an acquired excentric occlusion relationship, or what McLean called a "convenience relationship," which is the relationship in which the teeth occlude but one or both of the condyles are out of their normal position. The mandible is brought forward in closure and naturally the lower anterior teeth are brought forward a corresponding distance. There being no space for them, the lower anterior teeth are jammed against the lingual surfaces of the upper anterior teeth. Over a period of years they gouge out the lingual portion of the upper anterior teeth. The removal of the premature contact of the teeth in centric relation allows the mandible to assume its natural position in centric occlusion. A space is now evident between the labial surface of the lower anterior teeth and the lingual surface of the upper anterior teeth. This space may be enough to allow the placing of pinledge inlays to strengthen the upper anterior teeth.[28]

BASIC PREPARATIONS

Before attempting to balance or reconstruct the dentition, it is imperative to secure a set of study models made from accurate alginate or hydrocolloid impressions. These models should be mounted on an adjustable articulator using a face-bow, plus an accurate wax bite taken with the teeth in centric relation. This will give the dentist an opportunity to study all the excursions of the mandible and to determine approximately his plan of operation. A knowledge of the ideal centric occlusion and the ranges of occlusion will help the operator to determine what the discrepancies are, and if restorations are to be made, how to plan them so that they may function to best advantage.[29,30]

The importance of the proper use of the face-bow is shown by the following. The jaw opens from centric position to rest position and closes from rest position to centric position in a hinge-axis movement. The face-bow orients the maxilla to the hinge-axis movement with relation to the head. This axis, if correctly transferred to the articulator, becomes the axis of the articulator. If casts are mounted on an articulator without using a face-bow, the cast may be positioned incorrectly anteroposteriorly, or to the left or right, or there may be a combination of these errors.[31,32]

MATERIALS USED

The following materials are used when securing equilibration of the occlusion: prepared wax impression forms; plain

21. Jentzsch, R. A. The problem of occlusion. Illinois D.J. 7:387 (Oct.) 1938.

22. Orban, B. Tissue changes in traumatic occlusion. J.A.D.A. 15:2090 (Nov.) 1928.

23. Day, H. W. Normal functional occlusion: its importance in prevention and treatment of pyorrhea. J.A.D.A. 33:468 (April) 1946.

24. Grove, C. J. Trauma produced by occlusion due to horizontal stress. J.A.D.A. 11:813 (Sept.) 1924.

25. McCall, J. O. Traumatic occlusion. J.A.D.A. 26: 519 (April) 1939.

26. Stillman, P. R. Occlusion. J.A.D.A. 17:811 (May) 1930.

27. Thompson, J. R., and Craddock, F. W. Functional analysis of occlusion. J.A.D.A. 39:404 (Oct.) 1949

28. Brown, S. W. Disharmony between centric relation and centric occlusion as a factor in producing improper tooth wear and trauma. D. Digest 52:434 (Aug.) 1946.

29. House, M. M. Traumatic occlusion as a factor in periodontia: its detection and correction. J.A.D.A. 13:625 (May) 1926.

30. Zeisz, R. C., and Nuckolls, J. Dental anatomy; the form and function of the permanent teeth and the form and function of the deciduous teeth. St. Louis, C. V. Mosby Co., 1949.

31. Harris, E. Centric relation of the mandible. J.A.D.A. 37:565 (Nov.) 1948.

32. McCollum, B. B. Fundamentals involved in prescribing dental remedies. D. Items Interest 61:522 (June) 1939.

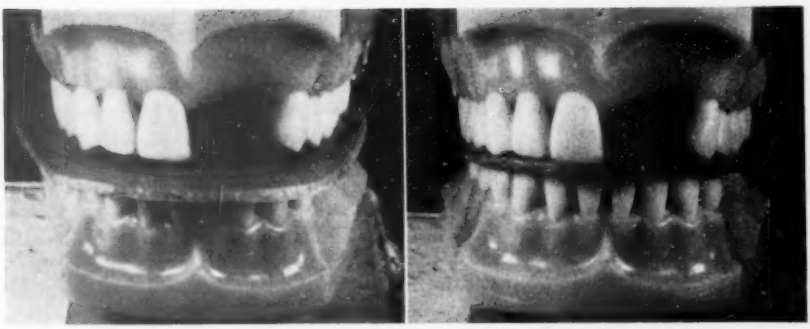

Fig. 1 • Left: Buccal line is marked on the wax impression form before the form is cut to size of the arch. Right: Form is cut one sixteenth of an inch beyond the buccal margin of the maxillary teeth

beeswax; aloxite grit no. 120; thick articulating paper; articulating paper holder; red cotton typewriter ribbon, medium inking, cut into strips the same size as articulating paper; hard wax strips ¾ by 3 inches; carborundum stones; diamond stones; sandpaper disks, fine grit, ½ inch; cocoa butter; rubber wheels; thermostatic water heater that can keep water at 115° F.

METHOD OF GRINDING

All grinding should be done slowly under a water spray to prevent sensitivity and overheating the tooth. Mobile teeth should be supported by finger pressure, or a compound block, when grinding and when articulating paper and red ribbon are used.

PROCEDURE OF BALANCING THE OCCLUSION

The goal in balancing the natural dentition is to distribute the load of centric occlusion contact to as many teeth as possible, which is done by balancing the teeth in centric occlusion; and to distribute the forces in lateral and protrusive ranges of occlusion to as many teeth as possible, which is accomplished by balancing the teeth in those ranges of occlusion. A definite procedure should be followed when balancing the occlusion. First: balancing the jaws in centric relation and centric occlusion; second: balancing the right lateral range of occlusion; third: balancing the left lateral range of occlusion; fourth: balancing the protrusive range of occlusion. It is best to perform these steps at four successive visits.

Centric Relation and Centric Occlusion • To obtain a centric relation record, a wax impression form is used. This form consists of two layers of wax with gauze in between. It is measured on the upper study model of the patient and a line is marked buccally (Fig. 1, left). Then the form is cut to the size of the arch, one sixteenth of an inch beyond the buccal margin of the upper teeth (Fig. 1, right).

The marginal half inch of the form is dipped in water which is kept at 115° F. This portion should be soft so that the teeth will enter the wax easily. The palatal portion will remain hard so that the wax form will be rigid under biting stress.

The palmar surface of the forefinger

of both hands is used to press this wax form against the occlusal surfaces of the upper teeth, especially the central incisors, so that an index of all the occlusal surfaces will be obtained. This form is then laid aside.

The following steps are necessary in order to obtain a centric relation bite. Before inserting the wax form, the patient is told to relax. The ball of the left thumb is placed on the buccal surface of the upper right bicuspid and the ball of the first joint of the forefinger is placed on the upper left bicuspid as shown in Figure 2, left. The ball of the right thumb is placed on the incisal edge of the lower anterior incisors with the nail up (Fig. 2, right).

The patient is directed to tap lightly with his teeth on the dentist's thumbnail. Then he is instructed to stop, to hold the teeth lightly against the thumbnail and to push his upper jaw forward. This device seems to work best. The patient usually retrudes the lower jaw. Then he is instructed to close his jaws lightly, the dentist having removed his thumb.

The patient then is told that the process will be repeated using the index wax bite which had been laid aside earlier.

The half-inch marginal edge of the wax form is dipped into 115° F. water. The form is then returned to the patient's mouth, care being taken that the teeth are in the original imprints. The aforementioned steps are repeated (Fig. 2, below). Figure 3, above, shows the patient closing his jaws in centric relation. The fingers on the maxillary teeth will tell the operator quickly if the patient is giving an excentric bite. The fingers are placed on the lower jaw to retract the lips. The patient should close lightly into

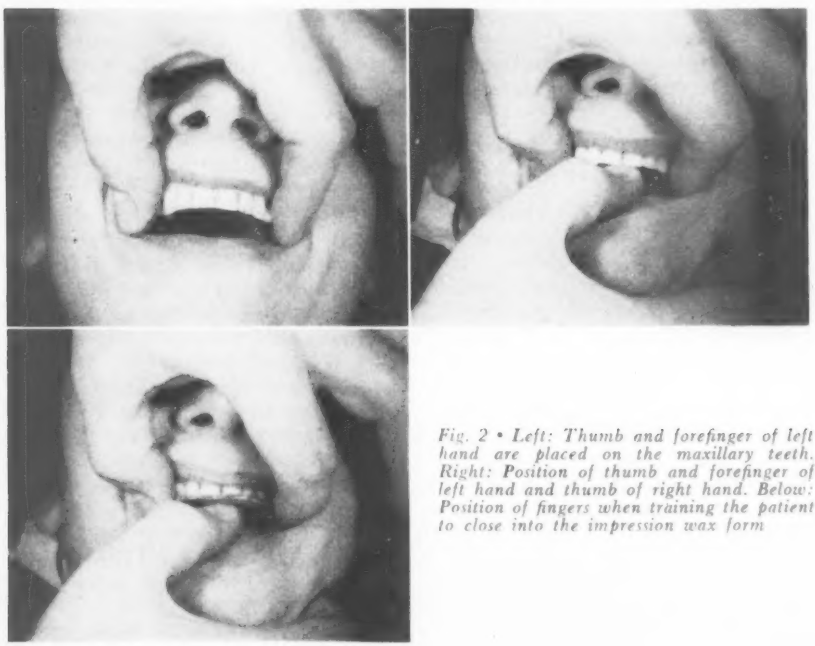

Fig. 2 • Left: Thumb and forefinger of left hand are placed on the maxillary teeth. Right: Position of thumb and forefinger of left hand and thumb of right hand. Below: Position of fingers when training the patient to close into the impression wax form

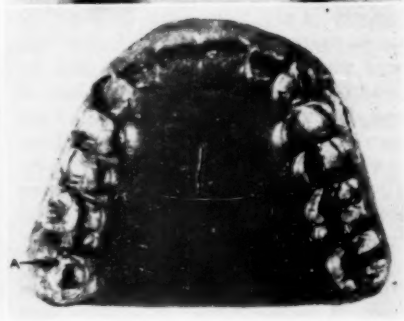

Fig. 3 • Above: Patient's jaws closed in centric relation. Below left: Wax bite without perforation used when mounting the study models on the articulator. Below right: Wax bite with perforation (A) which indicates premature contact

the wax repeatedly in a centric relation bite until a clear index is secured without perforating the wax (Fig. 3, below left).

The study models are mounted on an adjustable articulator with a face-bow, using the wax impression bite which has not been perforated to obtain centric relation.

A new prepared wax impression form is placed in the patient's mouth; the patient is asked to close his jaws again in centric relation until the first sign of a premature contact appears. The letter A in Figure 3, below right, indicates the hole in the wax which results from the premature contact.

If an error has been made in finding the premature contact, the hole should be filled with the plain beeswax and the patient should again close his jaws in centric relation. This is an accurate method of checking a premature contact.

The relationship of the cusps on the articulator should be studied. Where to grind in correcting premature contacts depends on the relation of the teeth in question to the other teeth when the jaws are in excentric positions. The occlusion on the articulator is studied and the decision made as to where to grind in centric relation and still give the patient the greatest amount of occlusal contact in the excentric ranges of occlusion. Softened wax strips are used to determine the relation of the patient's jaws in lateral and protrusive movements and to check with the articulator. This wax should be chilled with air or water when used. This will help to make certain that a tooth was not inadvertently taken out of a lateral range of occlusion when a premature contact in centric relation was corrected.

If, in centric relation, an upper lingual cusp of a posterior tooth makes a premature contact in a lower central groove, then the groove must be deepened but the point of the upper lingual cusp

should not be ground. It is also wise to widen the groove slightly to allow lateral "play" so that the Bennett movement is not locked.

The steps of training the patient in proper centric closure should be repeated. A piece of thick articulating paper, flamed so that it will mark better, is placed between the teeth on the side where the premature contact exists. The patient is told to tap lightly. The occlusal surfaces of the teeth must be dry. The same procedure is repeated but this time the red cotton ribbon is used instead of the articulating paper. This will give definite markings, usually a red dot on a smear of blue, on the tooth surfaces as well as on highly polished restorations. The markings on the teeth are compared with the wax registration of the premature contact (Fig. 3, below right).

The decision is made as to where to grind and is checked with the articulated casts. A carborundum stone, inverted cone type, or a diamond stone, is used to grind the marked surface, producing a rounded surface, not a nick or depression. Carborundum rather than diamond stones should be used at first so that very little is taken off the tooth. The patient should be told that it is like taking dust off a mirror. The occlusal markings of the articulator paper and ribbon are wiped off with a cotton roll in a hemostat.

The hole in the wax impression form indicating the premature contact is filled with plain beeswax.

To prove to the patient that a premature contact exists, some aloxite no. 120 grit is placed on the occlusal surfaces of the lower teeth and the patient is told to close his jaws in centric relation. The patient will soon point to the tooth which makes premature contact.

The bite and marking sequence is repeated. After the first premature contact is corrected, others will appear. By removing as many premature contacts as possible in centric relation, the occlusion of the teeth will come close to centric occlusion for that patient. The object is to get as much simultaneous occlusal contact as possible and not close the bite.

If there is premature contact of the anterior teeth in centric relation, it is usually best to grind the incisal edges of the lower anterior teeth. Frequently a premature contact occurs on the central ridge of a maxillary molar. This can be put safely in balance without too much loss of efficiency in the protrusive range.

After centric occlusion has been achieved, the anterior teeth should be tested for trauma. The existence of trauma on the upper anterior teeth can be tested by placing the ball of the forefinger on an upper anterior tooth while the patient closes his jaws in centric and movement of the tooth is produced. If trauma is present, the incisal edges of the lower anterior teeth, where the premature contacts exist, are ground. These contacts are found with ribbon and articulating paper. Facets must be eliminated and, if possible, a point contact of the incisal edges of the lower anterior teeth to the lingual surfaces of the upper anterior teeth, preferably in the center of the incisal edges, should be obtained.

Centric occlusion must be secured before balancing the excentric positions.[28,33-35]

Lateral Range of Occlusion • In the lateral ranges of occlusion the forces exerted laterally against the teeth are multiplied because of the leverage principles involved. These forces are the most destructive owing to the fact that the bony structures and the teeth are not anatomically designed to take this force on one or two pairs of occluding teeth. As many cusps of the occluding teeth and as many occluding teeth as possible should share

33. Bromfield, L. D. A method of taking centric relation. D. Survey 23:1590 (Sept.) 1947.

34. Madsen, B. C. Occlusion: a cardinal consideration. J.A.D.A. 41:691 (Dec.) 1950.

35. Westbrook, J. C. A pattern of centric occlusion. J.A.D.A. 39:407 (Oct.) 1949.

the load of mastication. This can be accomplished by the removal of premature contacts in the lateral ranges of occlusion. Figures 4 and 5 illustrate the theoretical basis for balancing a single pair of occluding molars so that both cusps function in the working bite.

The drawing on the left of Figure 4 represents an upper and lower molar in occlusion. This shows that lines AB and DE are not parallel. These lines represent the extension of the planes of the cusps. In the drawing on the right, the molars are in the working bite and the buccal cusps make the sole contact. If the tooth structure to the dotted line CFB is removed, two important mechanical changes are accomplished. One is the paralleling of lines AB and DE so that both cusps will function in the working bite. The second mechanical advantage takes place in the reduction of occlusal area by rounding the cusp off to dotted line CFB thus bringing the line of force nearer the long axis of the tooth.[18] The drawing on the left of Figure 5 illustrates the same molars as in Figure 4 but the planes of the cusp, lines LM and NO, are now parallel. The grinding was done at the dotted line UVM. The drawing on the right of Figure 5 shows that both cusps now contact in the working bite.[36]

Figure 6 depicts the proximating teeth on the right side of the jaw showing cuspids, bicuspids and molars in centric occlusion. This schematic representation shows the teeth in action. Although there is cusp and fossa contact, the lines AB, CD, EF, GH, IJ are not parallel.

Figure 7 shows the same teeth as those shown in Figure 6, but now they are in the working bite. Only the cuspid makes contact and there are spaces between the bicuspids and the molars. Figure 8 exemplifies the paralleling of all the inclined planes, KN, PR, TW, VX, YZ and the reduction of excess tooth surface at LMN on the cuspid, OSR and TUW on the bicuspids, and slightly on the molars at VX and YZ.[37] Only the inclined planes were reshaped and the centric relation contact of the cusps and fossae have not been altered. Figure 9 illustrates the teeth in the working bite and all the cusps make contact.

If in the lateral range of occlusion only the cuspids contact, each cuspid is bearing 50 per cent of the load (A in Fig. 10, left). If through occlusal equilibration, 10 teeth (5 maxillary and 5 mandibular) are brought into contact, each now bears 10 per cent of the load, and each cuspid now bears only one fifth of its original pressure (Fig. 10, right).

When the patient is told to move his jaw to the right or to the left he should be given a hand mirror so that he may observe himself as he makes these movements. The patient should move his jaws laterally until the cuspids are in an edge to edge relation. This is the second step in the series of equilibration of the occlusion. One side should be finished at a time.[38-41]

Centric occlusion must be maintained when balancing in lateral relation. The relationship of the articulating surfaces that maintain centric occlusion for the individual patient involved must be known.

A wax strip is warmed and molded over the occlusal surfaces of the teeth of one half of the lower arch. The patient then closes his jaws in centric relation. The wax is chilled and removed, the contacts (holes in the wax) noted, and the strip is laid aside. This impression shows the centric occlusion contacts for that side.

Another piece of warmed wax is used

36. Lerner, L. First principles in the treatment of pyorrhea. D. Digest 32:283 (May) 1926.

37. Radusch, D. F. Grinding for relief of occlusal trauma associated with periodontoclasia. J.A.D.A. 30: 384 (March) 1943.

38. Scott, W. R. Balancing the occlusion. J. Canad. D.A. 6:483 (Oct.) 1940.

39. Slocum, S. Traumatic occlusion. Oral Hyg. 16:1654 (Sept.) 1926.

40. Sutton, C. E. Some thoughts on traumatic occlusion. Pacific Den. Gaz. 34:109 (Feb.) 1926.

41. Tylman, S. D. Theory and practice of crown and bridge prosthesis, ed. 2. St. Louis, C. V. Mosby Co., 1947, ch. 17, 18.

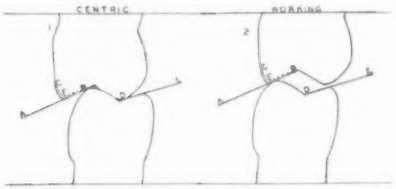

Fig. 4 • Drawing on the left illustrates a molar in centric occlusion; drawing on right illustrates the working bite with only one cusp touching at F

and the patient is told to bite in centric relation and to move his jaws into the lateral range of occlusion. (The patient can be told to rub to the right.) The number of contacts made by the upper and lower teeth is noted. This is then compared with the wax strip which was used to record the centric bite.

The principles illustrated in Figures 4, 5, 6, 7, 8 and 9 should be reviewed. The lateral range should be studied on the models. The operator must decide which areas of premature contacts to grind to bring more teeth into contact. The premature contacts are marked on the natural teeth by using the articulating paper and red ribbon when the teeth are in centric occlusion and in the lateral range of occlusion.

When the teeth are in centric occlusion, the marking paper and ribbon will mark those points on the lingual surface of the upper anterior teeth and those points on the labial surface of the lower anterior teeth which maintain centric occlusion. Once the patient's teeth are balanced in centric occlusion, these points (A in Fig. 11) must be left alone, otherwise the teeth will be taken out of centric occlusion.

Frequently the cuspids make the only premature contact in lateral range. This type of contact must be studied carefully. The upper cuspids have a peculiar relationship because they play a vital part in the protrusive and lateral range of occlusion (Fig. 6, 7, 8, 9). As much tooth structure can be removed in the cuspid

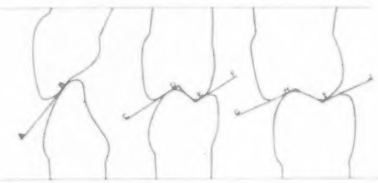

Fig. 6 • Proximating teeth in centric occlusion with inclined planes at various angles

area LMN (Fig. 8) as necessary to make the inclination of the lateral movement parallel to the posterior inclinations PR, TW, VX, YZ and the cuspid will not be taken out of centric occlusion contact.[42]

The patient, with his jaws in centric relation, bites on a piece of articulating paper. A mark will appear on the upper and lower cuspids. This can be likened to point N in Figure 8. This point maintains centric occlusion for that patient. If the patient is instructed to move his jaw into lateral range and articulating paper is between the teeth, markings will be found on the lingual surface of the upper tooth and the labial surface of

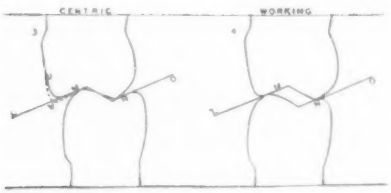

Fig. 5 • Drawing on left shows the same molar as in Figure 4 but area UVM has been removed. Drawing on right illustrates the molar in working bite. Note that both upper cusps contact both lower cusps

42. McLean, D. W. Occlusal orthopedics. D. Cosmos 74:313 (April) 1932.

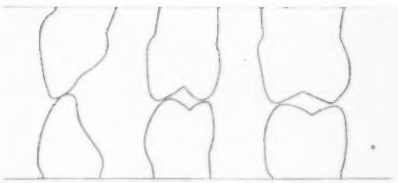

Fig. 7 • Same teeth as in Fig. 6 in lateral occlusion, with only the cuspid in contact

the lower tooth. The upper tooth is ground from the point, letter N, forward (but not the point itself) until as many teeth as possible are brought into contact (Fig. 9). This same principle is applied to balancing the lateral incisors and the central incisors in the lateral range of occlusion.

When the teeth are balanced in the lateral ranges, the contacts should be rechecked. These contacts manifest themselves by the holes in the wax strip made when the teeth move laterally. These should not be large circular holes such as those produced by two large flat cusps rubbing against one another, but should be diagonal tears in the wax which are produced by a point to point, or a point to plane, contact. Points need less force to go through food than flat surfaces.

A premature contact on the balancing side of the arch presents a serious problem. The force in the masticating cycle is exerted on the working side of the arch from the lateral range towards centric occlusion. This force brings the jaw to centric occlusion and a bit past centric. This "bit" is the Bennett movement. The condyle, on the working side of the arch, is set well into the fossa. In this position only the Bennett movement is present and the muscles that close the jaw pull upward. On the balancing side of the arch, the condyle must travel quite a distance backward and sideward to get the jaw back into its place in centric occlusion. Therefore, actually, the condyle is in free movement during the traverse, and any premature contact of the teeth would have a fulcrum effect and produce

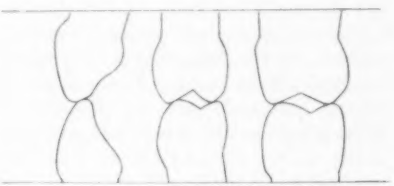

Fig. 9 • Same teeth as in Fig. 6 in lateral occlusion with all the cusps in contact

a lever of the first class and the condyle would be forced downward. This effect would produce a strain or torque on the whole joint (capsule, ligaments and condyle) which can and does cause trismus or subluxation of the joint.[43,44,45]

The lingual ridges of the buccal cusps of the lower molars or bicuspids and the buccal ridges of the lingual cusps of the upper molars and bicuspids, on the balancing side, may prevent contact of the teeth on the working side. The models on the articulator should be studied care-

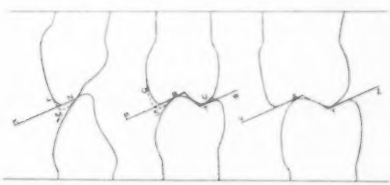

Fig. 8 • Same teeth as in Fig. 6 in centric occlusion. The areas LMN on the cuspid; OSR and TUW on the bicuspid have been removed. All inclined planes are now parallel

43. Bennett, N. Occlusion and articulation in relation to full denture prosthesis. Brit. D.J. 69:4 (July) 1940.

44. Riesner, S. E. Head and facial pains associated with disturbances of the temporomandibular joints. New York D.J. 13:65 (Feb.) 1947.

45. Wild, H. Lever action of the mandible. J.A.D.A. 35:596 (Oct.) 1947.

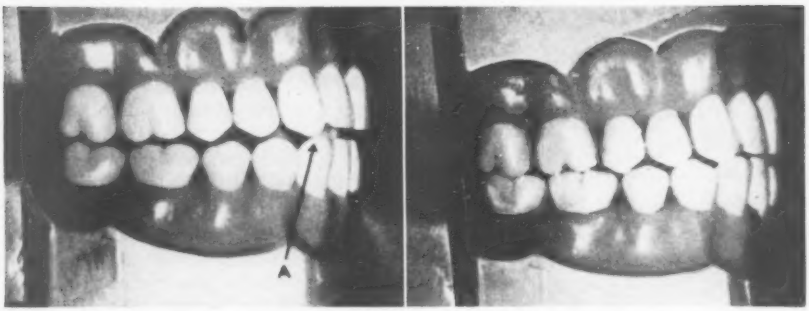

Fig. 10 • Left: Teeth in lateral range of occlusion but only the cuspid contacts at A. Right: After occlusal equilibration, the bicuspids and molars are brought into contact

fully in the lateral range and the balancing side noted. If there are any premature contacts on the balancing side, the spot to grind without taking the tooth out of centric occlusion must be determined. This grinding will bring the teeth together on the working side so that they can be put into balance.[46]

Illustration 1 of Figure 12 shows an upper and lower left molar and an upper and lower right molar in centric occlusion, in a buccolingual view. The cusp points and fossae that maintain centric occlusion and maxillomandibular relationship are A, B, C, D.

Illustration 2 of Figure 12 shows the working side open and a premature contact (C) on the balancing side. Now the question of where to grind arises. The lingual ridges of the mesiobuccal and distobuccal cusps at letter B of the lower molar should be ground up to, but not including, the point which makes centric occlusion contact in the fossa of the upper molar. If necessary, the buccal ridge of the mesiolingual cusps at letter A can be ground up to, but not including, the point which makes centric occlusion contact in the fossa of the lower molar. In this way, the teeth have not been taken out of centric occlusion contact.

If the removal of the tooth structure of both teeth is not sufficient to give contact on the working side, then one of the static relation contacts of centric occlusion must be sacrificed.

When the teeth are tilted buccally or lingually on the balancing side and they thus separate the teeth on the working side, the cusp points and fossae which maintain centric occlusion must be determined in the study casts and the spots selected for grinding which will leave these cusps and fossae.[46-51]

Protrusive Range of Occlusion • A differentiation must be made between protrusive position, which is the edge to edge bite in protrusive, and protrusive range of occlusion which is the movement of the jaw from centric occlusion to the protrusive position.

Many patients will say, "I don't bite

46. Schuyler, C. H. Fundamental principles in the correction of occlusal disharmony, natural and artificial. J.A.D.A. 22:1193 (July) 1935.

47. Bradley, A. M. Oral defense through occlusal stress reduction. D. Digest 48:277 (June) 1942.

48. Bricker, F. A. Diagnosis and correction of traumatic occlusion. J.A.D.A. 11:697 (Aug.) 1924.

49. Coleman, R. E. Equilibration of occlusion in orthodontics. Amer. J. Orthodont. 34:791 (Oct.) 1948.

50. Heisler, J. C. Occlusal adjustments. D. Digest 53:228 (May) 1947.

51. McLean, D. W. Diagnosis and correction of pathologic occlusion. J.A.D.A. 29:1202 (July) 1942.

that way" (referring to the edge to edge bite of protrusive position). A piece of wax is warmed and held about an inch away from the patient's lips. He should be asked to bite the wax quickly, and to keep his jaws in that bite. The patient will always move his jaw into a protrusive position. The patient should witness this in a hand mirror.

Balancing in the protrusive range is the last step of the over-all plan.

The median line of the face is marked in pencil on the patient's teeth as they are in centric occlusion. This may not necessarily coincide with the midline of the upper and lower teeth.

The patient should protrude his mandible, keeping to the marked median line, until the teeth are edge to edge. The patient will need a mirror to guide himself.

Figure 10, right, depicts an upper and lower central incisor and lateral incisor in centric occlusion. As many anterior teeth as possible should be balanced in the protrusive range and, if possible, to protrusive position but the teeth must not be taken out of centric occlusion. The point of contact (A in Fig. 11) on the upper and lower incisors should not be touched but from B to C can be ground, thus bringing more anterior teeth intó contact. This is a great aid to the patient because frequently only one or two pairs of teeth are in protrusive contact.

After the anterior teeth have been equilibrated in the protrusive range, the patient will be able to move his jaw into the proper protrusive range without difficulty and without the use of a mirror. In some instances the original deviation from the normal protrusive range for the patient is considerable, because the jaw had been guided by malpositioned or worn teeth.

The incisal surfaces of the upper anterior teeth are corrected esthetically using wheel stones or disks. Some esthetic reshaping of the lower anterior incisors can be accomplished but the teeth must not be moved from centric occlusion. This correction does a great deal for the patient psychologically.

The models should be studied to determine whether there are any interfering cusps in the molar region. If any are present they should be reduced. The patient moves his jaw into protrusive position (end to end) and a piece of ribbon is inserted between his teeth on both sides. The ribbon is pulled out and if the ribbon is caught it will show interference.

The points of the lingual cusps of the upper bicuspids and molars should not be ground. By shaving off part of the ridges of the cusps, sufficient closure may be effected. The distal aspect of the upper incisors and the mesial aspect of the lower cusp ridges of the bicuspids and the molars may be ground to effect closure.

When the equilibration is completed in all the ranges of occlusion, the anterior teeth may be retested by placing the ball

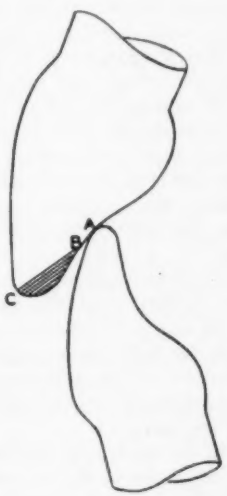

Fig. 11 • Centric occlusion contact is at A. To obtain contact in the protrusive range, the area BC may be ground, but A must not be touched

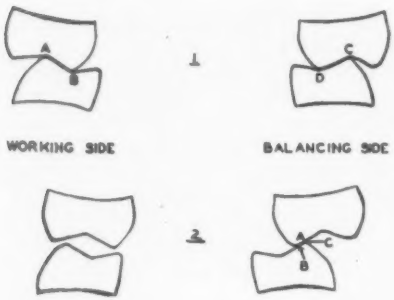

Fig. 12 • Illustration 1 shows teeth in centric occlusion. Illustration 2 shows a premature contact at C, on the balancing side

of the forefinger against the labial surfaces of each of the upper anterior teeth and having the patient bite in centric occlusion. This is a way of testing whether the bite has been closed a fraction. If this has been done, it may be corrected by reusing the impression wax form and making the correction in centric relation.

The individual tooth movement in the protrusive range of occlusion should be checked. The patient moves his jaw into the protrusive range and the operator successively places the ball of his forefinger on each maxillary incisor. If there is movement of the tooth, more balancing in the line CB (Fig. 11) is necessary.[52]

Any sharp flat planes of the cusps should be recarved to parabolic curves, if possible.

As the next step, all the ground surfaces are polished first with fine sandpaper disks covered with cocoa butter, then with rubber wheels, using water spray. Sensitive areas may be treated with Gottlieb solutions or with thymol or silver nitrate if necessary.

After the occlusion has been balanced, the inclined planes of the teeth must be free from irregularities and rough margins of fillings. As the point of a cusp passes over the cusps of the opposing tooth, it should glide in the same way that a rocking chair makes contact on the floor. Any slight elevation on the floor causes a jar throughout the rocking chair; so it is with the jarring action of a tooth. Traumatic effects are produced on the supporting structures of the teeth, and other effects are produced within the arch and condylar region.[44,53]

CROSS-BITES AND END-TO-END BITE RELATIONSHIPS

The models on an articulator mounted with a wax impression bite are studied and a method of procedure determined, keeping in mind that centric occlusion must be obtained. The upper buccal cusps and lower lingual cusps maintain vertical dimension; therefore, adjustments should be made on the lower buccal cusps and the upper lingual cusps. Also, it must be remembered that balance in lateral and protrusive range is necessary to distribute the stresses of mastication over as many teeth as possible. However, in achieving this the bite must not be closed.

CONCLUSION

The upper and lower teeth must be put into balance before any restorations are made, otherwise the existing defects will be accentuated. Teeth out of normal relation or extruded teeth may have to be altered or shortened and covered, or removed entirely. The patient should be told why his mouth must be put in balance, and he will be glad to have the necessary work done. It is important to check for balance in all the ranges of occlusion after all the teeth are restored.

A group of objectives have been presented which must be kept in mind when

52. Swank, E. R. Some considerations of operative restorations in relationship to traumatic occlusion. D. Cosmos 67:73 (Jan.) 1925.

53. Miller, S. C. Textbook of periodontia, ed. 2. Philadelphia, Blakiston Co., 1943.

seeking to obtain equilibration of the natural dentition by grinding. Only such surfaces should be ground as interfere with securing balance, and all surfaces and contacts that give the greatest degree of efficiency should be maintained. Tooth structure must be removed cautiously, because more can always be taken off but it cannot be put back. If any doubt exists, the surfaces on the model should be restudied carefully. This is preferable to making a poor guess.

By treating the mouth as a unit, the dentist rises above being a simple artisan who replaces missing teeth or parts of teeth. This service is a preventive measure and will help the patient retain his teeth, which is the highest goal of dentistry.

551 Fifth Avenue

Anesthesia in oral surgery

Paul H. Lorhan, M.D.; Charles H. Bishop,† D.D.S., and Ralph W. Edwards,‡ D.D.S., Kansas City, Kan.*

This discussion concerns the use of thiopental sodium (Pentothal Sodium) as the anesthetic agent for various oral surgical procedures. These procedures range from simple extractions to reduction and fixation of fractured jaws.

This survey covers a two year period, during which time 356 patients were operated on. Their ages ranged from five months to 84 years. Thiopental sodium was used alone or in combination with nitrous oxide, oxygen and curare or Syncurine. In 321 cases, the latter two drugs were employed when more complete relaxation was required. Vinyl ether or ether was used for children.

THIOPENTAL SODIUM

Thiopental sodium, a short-acting thiobarbiturate, will provide adequate relaxation for the majority of oral surgical procedures. Induction is rapid. Recovery, as with most agents, tends to be delayed in proportion to the duration of anesthesia. Postanesthetic depression may occur, and most patients, after recovering their major reflexes, will be drowsy or will fall asleep if they are not disturbed.

Thiopental sodium is a potent hypnotic, capable of producing respiratory arrest. It has little or no analgesic property. The stages of anesthesia are somewhat different from those seen with inhalation agents, since the first stage is not a stage of analgesia, but of clouded consciousness. The second stage is a stage of hypersensitivity. If the patient is left undisturbed, an excitement stage is seldom seen. The third stage is divided into light or deep planes, depending on the degree of respiratory depression. The fourth stage is that of impending respiratory and circulatory failure.

Respiration furnishes a reliable guide to depth of anesthesia. If the patient is

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‡Intern in oral surgery (1949-1950), University of Kansas Medical Center, Kansas City, Kan.

not disturbed, respiration becomes rhythmically machine-like with the onset of the third stage, then progressively shallower without much increase in rate until the late stages. A patient in light anesthesia may react to stimulation from the operative field by rapid shallow breathing or breath-holding or by prolonged expiration, which gives his respiration the appearance of third plane anesthesia. An increase of pulse rate may indicate deepening anesthesia with hypoxia or response to stimulation. The blood pressure falls slightly during thiopental sodium anesthesia, but stimulation or anoxia may raise it. With thiopental sodium it is important to correlate every possible observation in an attempt to judge depth of anesthesia.

Oxygen should be supplied with every thiopental sodium anesthetic and if there is any doubt as to its effectiveness respiration should be assisted.

For ordinary use, the 2.5 per cent solution of thiopental sodium is injected a few cubic centimeters at a time. It is advisable to watch for the signs of anesthesia and base the amount of each dose on the apparent effect of the preceding injection. Once anesthesia is established, only 1 cc. will need be injected at a time.

The single absolute contraindication to the use of thiopental sodium is inability to control the airway during the operative procedure and in the immediate postoperative period. This means that without an endotracheal tube thiopental sodium should not be used in any situation where pus, blood, mucus, vomitus, or other foreign material is likely to be released into the respiratory tract. If there is limitation of motion of the jaws, or if the jaws are to be wired together, an endotracheal tube should be used. Packing of the throat is essential in all oral surgical procedures. Intubation is not necessary in all oral surgical procedures, but the airway should always be controlled by means of pharyngeal packs. Endotracheal intubation is done routinely in all fracture cases where the jaws are to be wired together and in prolonged surgical procedures such as removal of impacted wisdom teeth and maxillary and mandibular cysts.

Other contraindications include shock, anemia, respiratory depression and any condition which predisposes to anoxia or in which anoxia constitutes an added hazard.

Thiopental should not be given to outpatients, unless they can be kept under observation for several hours, and someone should accompany them home. There are several possible objections to giving thiopental to children. Children have small veins for venipuncture, and many of them are more alarmed at the sight of a needle than at the smell of vinyl ether or ether.

Thiopental sodium should not be used alone for operations of more than 20 minutes' duration or for operations which require much muscular relaxation.

When it is combined with nitrous oxide-oxygen and curare, there seems to be no limit to the type and duration of the operations for which it can be used. By combining it with nitrous oxide and oxygen, the amount of thiopental can be decreased.

Administered rectally, thiopental is excellent as a basal anesthetic in the apprehensive or difficult patient. We have used it as the sole anesthetic agent on a number of small children; however, it is difficult to get profound anesthesia without running the risk of overdosing.

The continuous drip method of a 0.1 per cent solution is satisfactory for procedures which will produce little pain stimulation. By this technic, the anesthetic plane can be maintained at a lighter level and thus facilitate a more rapid recovery, although the induction period is longer.

PREMEDICATION OF THE PATIENT

The level of reflex irritabilities and the rate of oxygen consumption together with

the nature of the operation governs the preanesthetic preparation of the patient.

Premedication is given with the following aims:

1. To reduce metabolism and allay reflex irritability.
2. To produce psychic sedation.
3. To raise the pain threshold.
4. To counteract undesirable side effects of the anesthetic agent.

The classes of drugs commonly used are:

1. Opiates and opiate substitutes.
2. Barbituric acid derivatives.
3. Belladonna drugs.

The opiates elevate the pain threshold, reduce reflex irritability and produce euphoria, which is of great benefit to the patient contemplating an immediate operation. Meperidine hydrochloride, a morphine substitute, 50 to 100 mg., has analgesic properties, and is used to reduce reflex irritability and metabolic rate. It tends to cause less nausea and vomiting than morphine.

The short-acting barbiturates which are used for preoperative medication include vinbarbital, pentobarbital and secobarbital. These drugs are used principally for the psychic sedation they provide.

The belladonna drugs used are atropine and scopolamine. They are important in oral surgery in that they depress salivary secretions, reflex irritability mediated through the vagus nerve and counteract the respiratory depression produced by morphine.

Any of these drugs may be administered subcutaneously or intravenously. The maximum effect is reached almost immediately when administered intravenously.

SURGICAL PROCEDURE

When a patient is admitted to the hospital, the medical department executes the physical examination, with the circulatory and respiratory systems being stressed. There is also a dental history taken in the clinical examination with a complete oral roentgenographic survey and extraoral views when indicated. The patient is then seen by the anesthesiologist who prescribes proper premedication.

In all oral surgical procedures, the throat is packed off as soon as the patient is anesthetized. This is important and serves the purpose of keeping the throat completely dry from salivary secretion and hemorrhage. It aids in preventing laryngospasm, and it eliminates the possibility of the patient aspirating any foreign objects.

In placing the throat pack, the tongue is pulled forward and a 4 by 4 gauze pack is opened and one end is placed on one side of the throat and carried to the opposite side and back again until the throat is completely packed off. When the tongue is released, it is held forward to avoid obstructing the airway. Proper placement of the mouth pack is necessary in preventing respiratory obstruction.

If packs are pushed too far posteriorly, the soft palate is forced against the postpharyngeal wall and blocks the airway. Thus nasal breathing is prevented by the palatal obstruction and mouth breathing is prevented by the sponge. If the tongue is not pulled forward before placing the pack, it may be forced back over the laryngeal opening causing an obstruction.

In all oral surgical procedures both the oral surgeon and the anesthetist must keep the mandible and tongue forward to maintain a patent airway.

If there seems to be obstruction, a tongue suture is indicated. This is especially true in treating fracture cases if intraoral fixation is to be used. After the jaws are wired shut, it would be impossible to pull the tongue forward without cutting the fixation wires. Therefore, the tongue suture is placed and remains until the patient has completely recovered from the anesthetic. Obviously, the suture must

be tied so that the knot lies labially to the teeth in order that it can be removed easily.

In placing a tongue suture care should be taken to place it just anterior to the lingual frenum at the midline, to prevent unnecessary tenderness or hemorrhage.

After the surgical procedure is completed, the packs are removed, the throat is checked and aspirated. Gauze packs with a string attached are placed over the operative area and the strings taped to the face. These remain in place until the patient has recovered from the anesthetic.

In this series, a severe laryngospasm developed in four instances. This complication can usually be treated effectively by aspirating any mucus, forcing oxygen, injecting an additional amount of atropine or deepening the plane of anesthesia. If the spasm continues, intubation should be done immediately.

In the entire series, there was only one death. It occurred on the sixth postoperative day. The pathologist attributed the cause of death to terminal bronchopneumonia secondary to metastasis from a carcinoma of the uterus.

SUMMARY

The application of thiopental sodium by the anesthesiologist fulfills a great need in the treatment of oral surgical procedures. The patient will benefit by the skills of the oral surgeon and anesthesiologist working as a team, with each understanding the needs and requirements of the other.

Simultaneous recording of centric occlusion and vertical dimension

James E. Pyott, D.D.S., and Aaron Schaeffer, D.D.S., M.S., Baltimore

In many respects dentistry has made great strides in the direction of a better prosthetic service. Better materials have been developed and more accurate equipment has been designed. Now there are many choices of good impression, cast, and base materials. The technic for orienting the casts by means of a facebow on an anatomical articulator, the devices for easily and accurately obtaining the centric positions by means of intraoral and extraoral tracings, the methods of recording lateral and protrusive movements with plaster checkbites, are all scientific and mechanical advancements toward better denture technics.

Nevertheless, one factor in denture construction, the establishment of the proper vertical dimension in the edentulous mouth, has not been determined by the same exacting technics as have the other important factors. Vertical dimension is so closely allied with that of centric occlusion that the former cannot be determined without considering the latter.

Various procedures to determine either or both factors have been suggested by

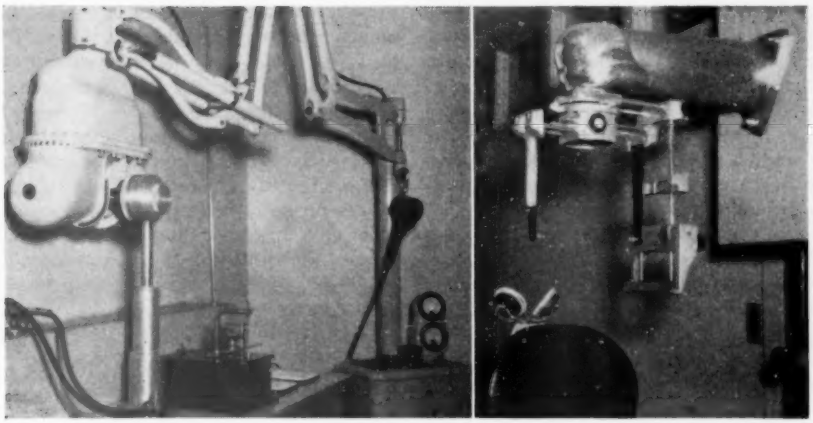

Fig. 1 • Cephalometer. Left: the stabilizer; right: the head positioner

many investigators, but no one has presented a method by which the two factors can be determined and recorded simultaneously and permanently.

It is the purpose of this paper to present a technic by which these two factors in the construction of a full denture may be scientifically determined and recorded —a method by which the factors, instead of being determined subjectively by experience and intuition, can be calculated by actual measurement, repeated easily and checked exactly.

The cephalometer (Fig. 1) used in our work has been described very adequately elsewhere in literature.[1] It consists of a stabilizer for the patient's head and a fixator for the x-ray tube. The head of the patient is stabilized by means of two plastic rods which fit into the patient's ears. The x-ray unit is fixed so that its central ray travels directly through the ear rods and is located at a distance of five feet from the midsagittal plane of the head. The cassette holding the film is moved as close as possible to the head in order to minimize size distortion. Since the inevitable size distortion on the film is measurable, the measurements made on the film can be corrected for it, but it is of small significance.

A number of years ago, using cephalometric technics, Brodie and Thompson[2] refuted concepts long taught in dental science that the teeth contribute to the facial height and that with the attrition or loss of teeth, facial height diminished correspondingly. They showed that by the third month of life the mandible assumes a certain relationship to the head which persists throughout the life of the individual. This position of the mandible, referred to as the rest position, is determined by the balance of the musculature which supports the mandible. The rest position is not affected by the presence or absence of teeth and it alone determines the vertical dimension of the face. This rest position is the position in which the mandible is carried normally when the mandible is not being used for such purposes as masticating or talking.

1. Broadbent, B. H. A new x-ray technique and its application to orthodontia. Angle Orthodont. 1:45, 1931.

2. Brodie, A. G., and Thompson, J. R. Factors in the position of the mandible. J.A.D.A. 29:925 (June) 1942.

There is a diminution in the facial height when the mandible moves from its rest position to the position where the teeth are in occlusion. This decrease is determined by the amount of space which exists between the teeth when the mandible is at rest; it is called the freeway space, or work bite. From his investigations on normal dentures, Thompson[3] calculated the average freeway space to be between 2 and 3 mm. Examination of patients with full dentures, where the vertical dimension was increased beyond the normal rest position, showed that after a period of time the mandible returned to its normal rest position and the normal freeway space was re-established at the expense of the bone supporting the dentures.

DETERMINATION OF REST POSITION AND VERTICAL DIMENSION

Of the many factors involved in the construction of full or partial dental prostheses which are esthetically pleasing and functionally sound, it is apparent that two of the more important are the rest position and the vertical dimension—vertical dimension of the face when the mandible is at rest and also the vertical dimension when the teeth are in centric occlusion. It is, therefore, obvious that a recording of vertical dimension must involve centric occlusion. The proper vertical dimension cannot be recorded unless the patient's jaws are in centric occlusion. As has been stated before, it is the purpose of this paper to present a technic to determine and record the vertical dimension when the patient's jaws are in centric occlusion. In order that the technics advocated in this paper be clearly understood, a step-by-step review of an actual case follows:

1. Impressions were taken and casts were made.

3. Thompson, J. R. The rest position of the mandible and its significance to dental science. J.A.D.A. 33:151 (Feb.) 1946.

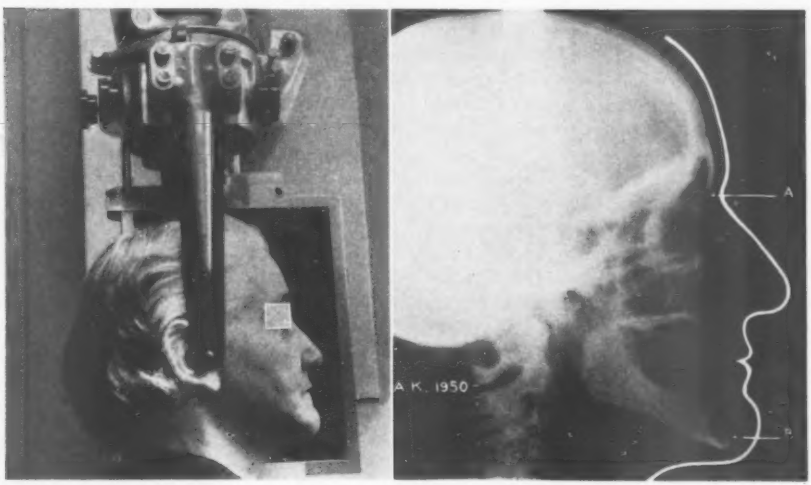

Fig. 2 • Left: Patient in rest position, completely relaxed, without dentures. Right: Roentgenogram showing the rest position. The distance between points A and B was 108.5 mm.

2. Bite-blocks were made.

3. Bite-blocks were cut down to provide the vertical dimension which the operator felt was correct.

4. By means of a face-bow transfer, using the bite-blocks from Step 3, the casts were mounted on an anatomical articulator.

5. Biterims were made and lined with paste for accuracy. Then Gothic arch tracing units, consisting of a central bearing point and external tracer, were fixed to the rims. The vertical dimension determined by the central bearing point had been arbitrarily set in Step 3.

6. In order to determine the exact vertical dimension, the determination and and recording of the rest position became a necessity. These were accomplished as follows: The patient, without dentures, was seated in the chair and her head adjusted in the stabilizer. The patient's sitting position was a normal one and was as comfortable as possible. Her head was not thrust forward or back nor was it under any strain and it was so adjusted that the Frankfort horizontal plane was parallel to the floor (Fig 2, left). Then the following technics were rigidly followed to secure 6 exposures to record the rest position: (*a*) The subject was engaged in conversation while the operator carefully watched her. When the operator felt that all the tension had been relieved and the patient was relaxed, the first exposure was made. (*b*) The patient was instructed to swallow. At the very end of the act of deglutition as the mandible came to rest, the second exposure was made. (*c*) The third exposure was made after the patient had repeated the sound "M" several times and the mandible had come to rest. (*d*) These procedures were repeated for three more exposures (Fig. 2, right).

7. The biterims with the central bearing point and external tracer (an internal tracer works just as well) were

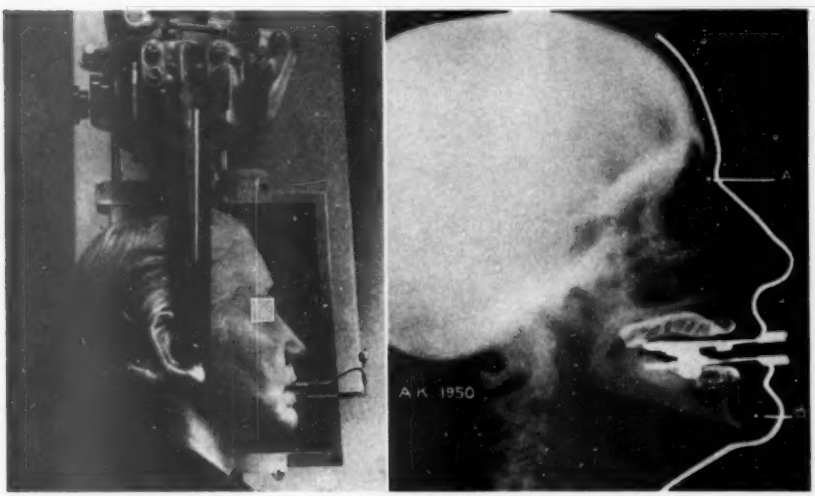

Fig. 3 • Left: Patient with jaws in centric occlusion. Plaster matrix in position. Right: Roentgenogram of the patient with central bearing point and external tracing unit recording the centric occlusion. The distance between A and B was 108 mm.

placed in the patient's mouth. With the biterims seated firmly, the patient was asked to make the various excursions: forward, backward and side-to-side. These movements, of course, inscribed the typical Gothic arch tracing. The patient was then instructed to move the mandible so that the extraoral stylus was touching that point on the Gothic arch tracing which is known as the centric position. Plaster was injected between the tracing device. When the plaster had set, another cephalometric roentgenogram was taken (Fig. 3).

8. When the roentgenograms were developed, two points were marked on every film: (A) nasion, at the suture between the frontal bone and the nasal bone and (B) pogonion, the most protrusive point on the chin. It was not absolutely necessary to select these two points. It was necessary merely to select the same two points on each film. This was done by tracing the nasal area and mandible of one film on a piece of tracing paper (Fig. 4). On the tracing paper a hole was punched through the point A, the point considered nasion, and another at point B, the point considered pogonion. The tracing of the nasal area was superimposed on each film and hole A was punched. Then the mandibular tracing was superimposed on each film and hole B was punched.

Fig. 4 • Tracings made of the nasal and mandibular areas on the roentgenograms shown in Figure 3. Holes were punched at A and B. These tracings were superimposed over every roentgenogram taken and the same points were punched on every film

9. On each of the six films, the distance between points A and B was measured to determine the rest position. Almost invariably at least five and usually six readings corresponded exactly. Certainly, if five readings correspond exactly and one is slightly off, it is not difficult to determine the correct rest measurement. In this instance the reading was 108.5 mm. (Fig. 2, right).

10. Measurements between A and B on the film indicating centric occlusion gave a reading of 108 mm. (Fig. 3, right). Since the mandible must close from rest to occlusion leaving a freeway space of approximately 2 to 3 mm., it was obvious immediately that the vertical dimension which was arbitrarily given the patient was too great. In the average case the measurement at centric always should be approximately 3 mm. less than the dimension at rest. In this instance, however, only 0.5 mm. of freeway space had been left, for the measurements recorded were: A to B reading at rest, 108.5 mm. (Step 9); A to B reading in centric occlusion, —108 mm. (Step 10); leaving a freeway space of 0.5 mm. Since between 2 and 3 mm. of freeway space was desired, it was necessary to adjust the central bearing point to "close the bite" approximately 2 to 2.5 mm. This was done arbitrarily.

11. The biterims with the new central bearing point setting were returned to the patient's mouth and the patient again was placed in the cephalometer. Another Gothic arch was inscribed. With the stylus at the centric position, plaster was in-

jected to obtain the new centric checkbite, and another cephalometric picture was taken (Fig. 5).

12. The same tracings made in Step 8 (Fig. 4) were superimposed over the new film indicating centric occlusion (Step 11), and the holes indicating points A and B were punched.

13. Measurements between A and B on the new film (Step 11) gave a reading of 106 mm. This showed a freeway space of 2.5 mm. had been left: A to B reading at rest, 108.5 mm. (Step 9); A to B reading in centric occlusion, —106 mm. (Step 13); leaving a freeway space of 2.5 mm.

14. The biterims with the plaster core were then used to reset the casts on the articulator.

15. The teeth were set up and the dentures cured.

16. The finished dentures were placed in the patient's mouth and the patient was instructed to hold the teeth in occlusion while another cephalometric roentgenogram was made. (See Figure 6, left.)

17. The tracings made in Step 8 (Fig. 4) were superimposed on the roentgenogram made in Step 16, and once again the holes A and B were punched on the film.

18. Measurements between A and B gave a reading of 106 mm. This showed that the dentures had not been distorted during the curing process and that the 2.5 mm. of freeway space had been maintained.

19. A roentgenogram was taken of the patient with her old dentures in position (Fig. 6, right). (Actually, this was done as one of the first steps, but in order not to confuse the reader, it was placed as the last step.) The distance between the points A and B was 108.5 mm. This showed that the patient's difficulty was caused by a lack of freeway space, for the measurement in occlusion was the same as the measurement at rest without dentures.

SUMMARY

The technic for recording the rest position has been reviewed. A technic for determining and recording the proper vertical dimension when the teeth are in centric occlusion has been suggested. In this way, the operator knows that he has left sufficient freeway space or work bite. Although it is true that the average freeway space is between 2 and 3 mm., some patients require more than the average, while others can function well with less. An absolute determination of the freeway space which should be provided in dentures can be made only before the natural occlusion has been destroyed by extractions. When this determination is impossible, the best service possible under the circumstances is rendered by providing the average freeway space. The dentist should be very cautious in reducing what he considers ex-

Fig. 5 • Roentgenogram of the patient with the new setting of the central bearing point. This time the distance between A and B was 106 mm.

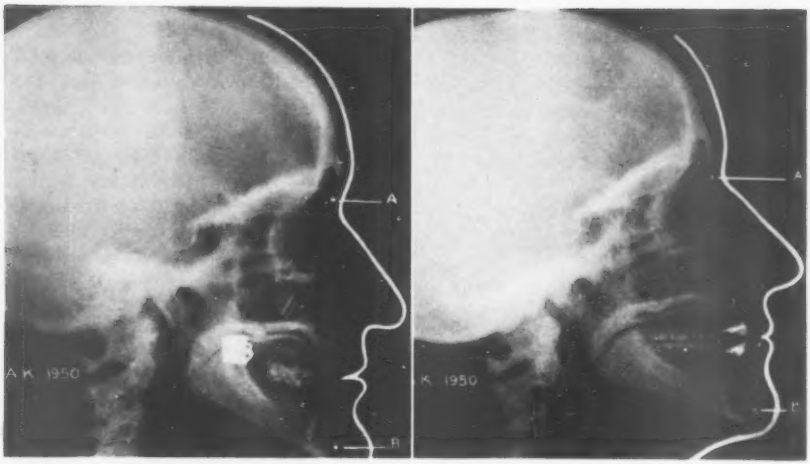

Fig. 6 • Left: The completed new dentures in centric occlusion. The distance between A and B was 106 mm. Opaque area is a cast gold postdam on the upper denture. Right: Patient with old dentures in occlusion. Distance between A and B was 108.5 mm., the same as the patient's rest position. The patient could not wear these dentures because there was no freeway space

cessive freeway space in dentures that have been functioning well for years. If the dentures permit a freeway space of 4 or more mm., probably it will be to the patient's best interest to retain all or almost all of that space. Similarly, if a patient has been functioning well for a number of years with a freeway space slightly less than two mm., it is advisable to maintain that same freeway space in the new dentures.

Although the technic outlined in this paper might, on first reading, appear too challenging and the equipment expensive and difficult to use, we can say advisedly that such is not the case. The complete cephalometric setup can be purchased for approximately $400, and the roentgenograms, after a little experience, can be taken with a minimum of effort and time, using a regular dental x-ray machine.

Using this technic, we have completed a large number of dentures which have given amazing results in function and patient satisfaction. The technic described in this paper can be adapted easily for partial denture prosthesis and for full-mouth rehabilitation.

206 Medical Arts Building

Cases and Comments

FRACTURE OF MANDIBLE WITH CELLULITIS AND DRAINING SUBMAXILLARY LYMPH NODES: REPORT OF A CASE

By C. W. Newman, D.D.S., Indianapolis.

This case is reported to show one result that may occur from a mandibular fracture that is untreated for a considerable time.

History • A 25 year old white man was seen in November 1947. He was suffering from a painful swelling of the right cheek. The cause of the swelling was not readily apparent. The patient reported a slight elevation in temperature at the time of examination. He had been in an automobile accident in August 1947, which resulted in no known injury to the jaw except a tenderness of the chin. A slight purulent discharge from the soft tissue around the lower right second molar was noted on December 24, 1947. Four days later, an incision was made by his physician on the right exterior surface below the mandible, with a consequent stoppage of intraoral drainage. However, extraoral purulent drainage occurred continuously from the site of the incision up to the time the patient was admitted to the hospital on February 24, 1948.

Examination • Positive findings were limited to the head and neck. In addition to the region of drainage, there was a diffuse swelling over the lower right jaw and some granulation tissue around the region of the submaxillary lymph nodes. The tissue in this region was painful and slightly indurated. Except for a little trismus, the mouth appeared to be normal and well kept.

Lateral roentgenograms of the right side of the mandible revealed a linear fracture through the body just anterior to the angle (illustration, left). There was no displacement of the fragments, but the third molar was impacted and lay in the line of fracture.

Laboratory Report • Hematologic analysis showed the following: hemoglobin 14.1 Gm.; red blood cells 4,100,000 and white blood cells 6,300 (normal differential). The bleeding time was two minutes and coagulation time four minutes. Results of serologic analyses were negative and urinalysis was within normal limits.

Surgical Procedures • On February 25, 1948, the impacted lower right third molar was removed surgically under local anesthesia. The fracture fragments were not separated at this time and seemed to be firmly joined. On February 26, 1948, an operation was done under thiopental sodium anesthesia. Morphine (¼ grain) and atropine (1/100 grain) were used for premedication. An incision 1.5 cm. in length was made along the inferior border of the mandible below the right third molar region. Curved hemostatic forceps were passed through the soft tissue to the fracture site. No pus was encountered, but a straw colored serous exudate was evacuated. A curet was used to clean out the fistulous tract and the submaxillary lymph nodes. The tract was probed to the fracture site and Penrose drains were introduced. The drains were covered with sterile gauze dressings.

Left: Lateral view, revealing linear fracture through body of right side of mandible; right: lateral view, revealing union of fragments of right side of mandible with evidence of healing

Course • Normal saline solution was used to irrigate the mouth and codeine (1 grain) was administered every four hours, as necessary, for sedation. Penicillin (25,000 units) was given every three hours from February 24 to March 2. The patient was febrile for two days following the operation. The Penrose drains were removed on February 29. On March 2, drainage had stopped from the lymph nodes. By March 8, drainage had stopped from the other incision and all swelling had subsided. The incisions appeared well healed by March 15 and the tooth socket was healing satisfactorily. Clinically, the fragments were firmly united. The patient was discharged at that time with instructions to return later for a check-up. Roentgenograms taken on June 1, 1948 showed evidence of healing on the right side of the mandible (illustration, right). The two scars were scarcely noticeable. The patient was regarded as cured with no need for further treatment.

Remarks • The normal hematologic picture suggests an infection of low virulence. It appears from the history that the patient may have fractured his jaw at the time of the automobile accident in August 1947. The fragments would probably have united spontaneously, if it were not for the impacted third molar in the line of fracture. In this event, the patient would never have been aware of the fracture. Had prompt treatment been instituted in November 1947 when the symptoms were noticed, the impacted molar could have been removed and involvement of the lymph nodes probably avoided. Lack of knowledge by the patient of the fracture undoubtedly accounts for the delay in treatment.

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Sponsored by the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are a result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

TECHNIC FOR REDUCTION OF MANDIBULAR DISLOCATION

By S. O. Tatkin, D.D.S., M.D., Grandview, Wash.

A new and simple technic for the reduction of mandibular dislocations has been developed which eliminates some of the difficulties encountered in the customary method.

The method which has been described most frequently requires the exertion of force by the operator's thumbs on the occlusal surfaces of the molar teeth. This technic has several disadvantages and it sometimes results in damage to the operator's fingers. The force which can be applied by this method is governed by the position of the operator, with no resulting leverage advantage. Moreover, great pressure may be necessary to reduce the mandible, which is often not obtainable in a controlled manner.

The proposed method consists of using several tongue blades which have been padded on one end with gauze and adhesive tape. The padded end is inserted between the occlusal surfaces of the molar teeth on the affected side. Two sets of tongue blades may be used in cases where bilateral force is indicated. With the patient under general anesthesia or sedation, the tongue blade is inserted at an angle. Pressure is applied externally in an upward direction on the chin and the tongue blade or blades are rotated in the manner of turning a key in a lock. By this method a positively controlled force is utilized in guiding the condyle back into its proper position in the glenoid fossa. Although the technic is simple and less taxing on the operator, much force can be exerted. Application of external pressure to the chin by the operator or assistant, while the tongue blade is being turned, permits control of the movement.

The proposed method has been utilized with uniformly good results in those instances where the force from the operator's thumbs proved inadequate to reduce the dislocation.

REIMPLANTATION OF AN UPPER LEFT CENTRAL INCISOR: REPORT OF A CASE

By G. James J. Falvello, D.D.S., Hazleton, Pa.

J. A. F., a 17 year old male third year high school student, was referred for treatment on June 6, 1950. On the previous evening during an argument in an outdoor basketball game, the patient had been struck on the mouth with a fist. The trauma resulted in expulsion of the maxillary left central incisor and laceration of the lower lip in the median area. The alveolus, containing a blood clot, had been edentulous for 23 hours.

The alveolar wall exhibited no crepitation. Roentgenograms revealed no fracture of the alveolar wall and no retained root fragments. A large nutrient canal was observed in the bone between the central incisor alveoli (illustration, A).

On questioning the patient regarding his

A: Occlusal view shows alveolus after traumatic loss of left central incisor; B: reimplantation of tooth with splint of stainless steel wire (Aug. 6, 1950); C: reimplantation with stainless steel wire splint removed (Aug. 21, 1950); D: slight cemental resorption on distal surface of the apex of reimplanted left central incisor

tooth, he produced it, wrapped in a small piece of newspaper. It was a well formed, noncarious tooth with no attached periodontal tissue or fracture lines. It was placed in a small vessel containing a 1:1,000 solution of Zephiran Chloride for 15 minutes. The pulpal tissue was removed by reamer and broach through the apical foramen. The tooth then was placed in a fresh solution of Zephiran Chloride for 15 minutes.

Monocaine hydrochloride containing 250,000 units of penicillin was injected locally and the upper anterior mucosa was painted with tincture of Metaphen. The blood clot was removed from the alveolus, particular care being taken not to traumatize the periodontal membrane. With a cotton roll under the upper lip and a saliva ejector in the floor of the mouth, a sterile gauze pack was placed into the alveolus. The left central incisor was removed with sterile forceps from the Zephiran Chloride solution and placed on a sterile gauze pad. Dentalone solution (chlorobutanal, clove oil, methyl salicylate, oil of cassia, and cinnamic aldehyde) was introduced through the apical foramen into the root canal and pulp chamber. The sterile gauze pack was removed from the alveolus and tincture of Metaphen was applied followed by Dentalone solution. The left central incisor was then positioned in the alveolus.

Stainless steel wire (0.016 inch) was placed from the distal aspect of the right central incisor lingually to the distal aspect of the left lateral incisor through the embrasure labially to the mesial aspect of the right central incisor and both ends were twisted and cut. Small wire loops were then placed at the mesial and distal aspects of the left central incisor (illustration, B).

The patient was instructed to give up trumpet playing for three months, and to apply an ice pack to the upper jaw, one-half hour on and one-half hour off, for six hours. He was placed on a soft diet supplemented with vitamins and all the orange juice and milk he could drink. Empirin (10 grains) and codeine (0.5 grain) were prescribed for relief of pain.

On June 7, the upper lip appeared edematous. The labial mucoperiosteum was incised to permit escape of the exudate and tincture of Metaphen was applied. By June 10 the edema had entirely disappeared and the tissue was pink and normal and by the following day the tooth was firm and the patient was again eating a varied diet.

The patient subsequently was seen twice weekly and on August 21 the wire splints were removed and roentgenograms taken (illustration, C). The implanted tooth seemed firm, although it had lost a trifle of its normal hue. No root canal filling had been inserted since the apex would be hermetically sealed by the positioning of the tooth in the alveolus. It was felt that the rich supply of collagenous fibers of the periodontal membrane would reattach themselves to the sterile root.

There was no evidence of recession of the labial or lingual gingivae, which appeared pink, dense and firm. Roentgenograms disclosed little change, except for a slight resorption of cementum of the distal surface of the root apex (illustration, D). The tooth remained firmly in place and the patient was able to resume playing the trumpet.

Capitol Theater Building

COUNCIL ON LEGISLATION

Statement of the American Dental Association before the House Committee on Appropriations regarding the proposed appropriation for the Dental Division of the U. S. Public Health Service, February 19, 1952

Following is the prepared statement written by E. H. Gale, chairman of the Council on Legislation, and presented to the House Committee on Appropriations in support of an appropriation to provide technical assistance to states in connection with fluoridation of water supplies and to urge the Congress to provide funds to construct a building for the National Institute of Dental Research. This testimony will be presented later to the Senate Committee when that body is considering the appropriations bills.

Mr. Chairman and Gentlemen
of the Committee:

I am Dr. E. Harold Gale of Albany, New York, a practicing dentist of that city. I am here this morning as chairman of the Council on Legislation of the American Dental Association to discuss with you the budgetary recommendations of the Dental Division of the Public Health Service and, on behalf of the American Dental Association, to make certain suggestions concerning that budget. With me is Mr. Francis J. Garvey of Chicago, Illinois, the Secretary of the Council. At the conclusion of this statement either of us will be glad to attempt to answer any questions the Committee may desire to ask.

One item in the budget is the amount of $250,000 to be made available in the form of grants-in-aid to states for the purpose of providing funds to employ technicians to assist local communities in studying their water supplies in relation to fluoridation. The Association, for reasons which I will discuss, desires to recommend that this be increased to $750,000, that it be specifically earmarked for this purpose, and that it be made available as soon as possible. One item which is not in the budget is the sum of $1,900,000 which is the balance of $2,000,000 authorized by the 80th Congress for the construction of a building for the National Institute of Dental Research. The Association likewise recommends that this item be added to the appropriations for the Dental Division of the Public Health Service and be provided at this time.

Let me discuss each of my requests in turn. The first relates to grants to assist in the study of fluoridation of community water supplies. I know that Dr. Bruce Forsyth, the Chief Dental Officer of the Public Health Service, has already discussed this matter with you. I have not seen a copy of his testimony so I hope you will bear with me if I repeat some of the basic information on this subject which he may already have presented to you.

Dentists have been interested for more than 30 years in the effect the element fluorine has upon the teeth. After lengthy research it has been discovered that it has an affinity for the tooth structure which tends to reduce the number of cavities which might ordinarily be expected to occur where the teeth of children

have not been exposed to the element. Where fluoride-bearing matter is used from infancy on there can safely be anticipated a reduction of 60 to 65 per cent of the number of cavities ordinarily expected to be found in a given age group. The American Dental Association carefully evaluated the studies which have been made in this field, together with the data supporting them. Finally, in 1950 its House of Delegates adopted the following resolution:

> *Resolved,* That in the interest of public health, the American Dental Association recommends the fluoridation of municipal water supplies when the fluoridation procedure is approved by the local dental society and utilized in accordance with the standards established by the responsible health authority.

This resolution placed the dental profession squarely on record in favor of the fluoridation of community water supplies.

The beneficial effects of fluorine on the teeth of children can be obtained in two ways: (1) by direct topical application of sodium fluoride to the tooth surface; (2) by fluoridating water which will be drunk by young children. During recent years the Congress has provided money to the Public Health Service for the maintenance of demonstration teams to teach and popularize the use of the first method. These teams have generally fulfilled their mission and this demonstration program will be discontinued. The topical applications to teeth will, however, continue to be made either by private dentists or, in some areas, in connection with school health programs. In other words the federal funds expended for this purpose have been wisely used and have stimulated interest in this health measure.

Community water supply fluoridation is the next step. This process is less expensive, in terms of per capita cost, and more effective, in terms of anticipated decrease in the incidence of caries, than is the topical method. Both, however, will continue to be employed as health measures because community water supply fluoridation obviously does not reach those persons who draw their water from private wells or other noncommunity sources. The funds which are sought in this appropriation will be used by states to employ technical experts who will be made available to local communities which need assistance in evaluating their own water supplies in relation to fluoridation and for providing technical services in fluoridation projects. The funds will not be employed either to purchase equipment or material for actual operation. The Association believes that such cost is the responsibility of the citizens of the individual community. However, it is more efficient and more economical to provide a technical staff at the state level to serve as consulting experts on the problems which may arise, than it is to set up such a staff in each individual community. Inquiries made by the Association among the states indicate that they neither have nor expect to have the funds made available from state sources to provide this service. Consequently, because of the widespread incidence of dental caries the Association is willing to recommend that these initial funds be provided by the federal government.

This service is necessary because no two communities have exactly identical water. All of it is affected to some extent by the geological conditions present in the area from which it is obtained or through which the water passes from its source to the drinking water supply. It therefore becomes necessary in any program involving community water first to analyze that water to determine exactly what it contains. When fluoride is to be added it is particularly important to know whether the water already contains this element and if so in what quantities. If the amount is excessive it may be necessary to remove some of the fluorine rather than to add more. Fluorine in the water supply is not harmful in the quantities recommended for this purpose. This amount is approximately 1 part fluorine to 1 million parts of water. Many communities have water supplies which contain far in excess of this amount.

There are about 16,000 community water supplies in the United States which cover about 100 million people. Studies already made indicate that 470 communities naturally have about the proper fluorine concentration, 230 have too much fluorine (this produces a staining of the teeth), and 200 are now adding fluorine. These figures are constantly changing as more communities study their water supplies from this point of view and take steps to make the necessary adjustments. The appropriation which we seek would help to evaluate the needs of communities now considering the problem.

Bear with me, please, while I present some facts which illustrate the extent of the dental health problem in this country. The facts are not new. They have been presented to your Committee and to other committees of Congress before. Ninety-five per cent of the population is affected with one form of dental disorder or another at some time between the cradle and the grave. Among the afflictions which most persons may expect to experience is the dental disease known as caries, which is more commonly spoken of as cavi-

ties in the teeth. I believe I would be safe in saying that there is not one person in this room who has not, at some time or another, sat in a dental chair for the purpose of having a tooth filled, which is the ordinary treatment employed to stop and repair the effects of dental decay. It is probable that this experience has been repeated not once, but many times.

I can make this statement confidently without having first made a personal examination of any member of the committee because as a dentist I am acquainted with the statistics on dental disease. Studies have indicated that 50 per cent of children in the two-year age group will have one or more decayed teeth. By age 6, when most children start grammar school, we expect to find at least three deciduous teeth with cavities. Fourteen per cent of all children will develop carious lesions in their 6-year-old molars which are their first permanent teeth. Five years before they are eligible to vote, or at the not too advanced age of 16, most adolescents will have at least seven teeth which either are missing, have present evidence of decay, or have been filled, and at least 14 tooth surfaces will be involved. By the age of 50 more than half of the population is either wearing dentures or has a number of teeth missing which should be replaced by artificial teeth.

Any disease so universally prevalent and with such continuous effect on all age groups in the population manifestly constitutes a major health problem and involves a continuous money cost. Last year, for example, it is estimated that more than one billion dollars was expended for dental care. Some forty million dollars was spent by the Veterans Administration in the form of direct payments to dentists for hometown services rendered to veterans. Additional millions were expended by the federal Government for the dental care of veterans by Veterans Administration-employed dentists; for the care of the numerous beneficiaries of the Public Health Service; and for the care of members of the Armed Forces. Still other millions were expended by states and by local communities for the care of institutionalized persons and indigent persons not institutionalized. It is safe to say that had every person who needed dental care last year sought it, from private practitioners or public sources, the total cost would have been several times as much as was actually expended.

Within a few days the Congress will consider a measure to place in operation Universal Military Training. UMT is not proposed as a temporary program. It will be, so far as we can see at this time, a program which will affect all 18-year-old males from this point on. In connection with this program the Association has recommended complete dental examinations of all persons inducted into the National Security Training Corps, but has also recommended that any dental treatment be limited to that required for the immediate comfort of the trainee and to that which is required to enable him to perform his training duties. It would be ostrich-like, however, not to foresee that, at least for the next few years, large numbers of 18-year-olds will be transferred directly from the National Security Training Corps to active duty in a Reserve component of the Armed Forces.

When this occurs the Government will provide such individuals with a greater quantity of dental care than will be necessary under the UMT program and will become liable to such individuals for possible service-connected dental care under veterans laws. Further, one has only to read the arguments advanced on the subject during the past five years to realize that once the 6-months' UMT training program is in operation, the Armed Forces will seek to extend the required period of training to one year or longer. Under such circumstances it may be necessary to grant more dental care to individuals undergoing Universal Military Training.

This military situation has a direct bearing on this appropriation which you are considering today. In the early days of World War II about one-fifth of the persons rejected for physical defects could not meet the dental requirements of the Armed Forces. Dental disorders were so prevalent that it became imperative for the services to accept even those persons who had no teeth at all in order to avoid large-scale rejection of young men otherwise fit for military service. This in turn involved extensive and costly dental treatment and it had, to enable such draftees to perform their duties, the further effect of withdrawing nearly one third of all licensed dentists from the service of the civilian population into the Armed Forces. Some of these military dental costs will inevitably be repeated during the present emergency and on account of the establishment in this country of Universal Military Training.

These costs, both public and private, can be appreciably diminished in the years to come if the benefits of community water fluoridation are made available to the coming generation.

Last year, after the House had acted on the appropriation bill, and while it was pending before the Senate, representatives of the Association appeared before the Appropriations Committee of that body to urge the in-

clusion of an item of $1,750,000 in the fiscal 1952 budget for this purpose. At that time it appeared as if a sum of that magnitude might be needed to provide the funds then thought to be necessary. Since that time the Association has queried the dental health directors of each of the states to ascertain (1) whether or not a state needed such assistance and (2) the amount that would be required for the particular state. Let me give you a few samples of the answers received from different states:

West Virginia • We have discussed the subject of federal grants-in-aid funds to assist our dental program, and are firmly convinced that such assistance is necessary if the people of this state are not to be deprived for many years of the health benefits of water fluoridation. . . . There are 460 public water supplies most of which are in small communities. . . . Our estimate of total personnel and funds which will be required over and above what we now have or will be able to provide at state level is $44,000.

New York • The type of program . . . would not be particularly needed in New York State, since there is an adequate staff in this Department at the present time to carry on the promotion of fluoridation at the local level. . . . While New York State may not require any additional personnel . . . it is quite likely that such a need exists in other states.

Indiana • The Indiana State Board of Health has sufficient personnel to carry on its water fluoridation program. . . . However, it could use federal funds that would be earmarked for general dental services.

Oklahoma • . . . I will say that fluoridation programs in Oklahoma could probably be expedited by the addition of more stenographic and laboratory personnel. I question whether or not more dental or engineering personnel are needed right now.

Illinois • As 90 per cent of the population in Illinois can eventually be partially protected against dental caries through fluoridation, the following budget would not be excessive if compared to the dental bill where all the carious teeth had to be corrected: State (outside of Chicago) $118,000. City of Chicago, $50,000. Total $168,000.

Missouri • We are definitely in support of a federal grant-in-aid to states for use in fluoridation programs and studies. (A budget of $10,750 is mentioned as Missouri's need.)

Massachusetts • It is our estimate that the funds necessary for . . . a program of fluoridation at the state level would be $16,000. This would have to be in addition to our already budgeted activities and hence would have to be provided entirely by federal funds.

California • The proposal (a grant-in-aid for fluoridation) coud be of great help to us in California provided we could get qualified personnel. Indicated funds needed: $10,000 plus travel.

Colorado • A grant-in-aid program to assist in the establishment of fluoridation programs in Colorado would not only be feasible but very desirable. The estimated cost . . . would be approximately $19,500. None of this sum could be financed from current or anticipated revenues without reducing some other phase of the dental program.

Georgia • We have agreed in general on the desirability of having . . . Congress provide funds on a grant-in-aid basis to state health departments for the purpose of promoting fluoridation. The money needed: a minimum of $17,000.

Idaho • The earmarked funds for the promotion of fluoridation would certainly be a great help to states all over the country. Money needed for Idaho: $18,720.

Michigan • It is gratifying to learn that you intend to support an appropriation, to be used, on a grant-in-aid basis, for the purpose of providing technical personnel to advise concerning community water fluoridation programs. Although we in Michigan have both dentists and engineers who are qualified to render this service we could use more such personnel and the only way I see of obtaining the money to pay for their services is through some such program.

The Association queried all 48 states and the District of Columbia with regard to whether or not they would need federal assistance to conduct studies of this nature and, if so, what amounts would be required for the next fiscal year. Thirty-seven replies were received. As can be seen from some of the excerpts, not all states felt that they either needed money or that the program would be feasible in their states. However, 23 states not only said that they would need money but indicated the amounts which would be required from the federal Government. The total of these specified amounts was $506,000. It is reasonable that at least half again as much would be required to provide funds for all the states which might seek such aid. The American Dental Association therefore recommends that the amount presently set forth in the budget

for this purpose be increased to $750,000 and that this sum be recommended to the House for approval.

The American Dental Association further requests that the sum of $1,900,000 not presently included in the budget (representing funds authorized by the 80th Congress for the construction of a building for the National Institute of Dental Research) be inserted in the budget by your Subcommittee and recommended to the Congress. The various agencies of the National Institute of Dental Research are presently scattered throughout the country. It appears to the Association that it is impractical properly to coordinate these research programs under such circumstances and it believes that it is imperative to gather the various research units into one place as soon as possible. The Association would like to point out that the 81st Congress appropriated the sum of $100,000 for the purpose of drawing plans and specifications for a building for the purpose to be located on the Bethesda grounds of the Public Health Service. These funds have been expended and the plans have been completed for nearly two years. Unless the plans are employed soon for the construction of the building, not only will the $100,000 already spent be wasted, but the rising costs of building construction may require additional funds when funds in accordance with this authorization are finally appropriated.

The Association is well aware that it has come here this morning and asked your Committee to appropriate $2,400,000 over and above appropriations already contained in the budget. It is also well aware that you are considering the highest budget in peacetime history, but the Association, as an organization which must exist on a budget itself, knows how budgets are made and how they can be adjusted. As taxpayers, the members of the Association would respectfully urge you to present as limited a budget as is consistent with the needs of the country. As members of the health profession and as experts in the field of oral health they would urge upon you that the program which their representatives have presented to you this morning is extremely important to every individual in the nation, and they believe that these requests should be given high priority in the consideration of items to be retained in, or added to, the budget.

In conclusion may I ask that you have the three-page statement on the subject of fluoridation of water supplies issued by the Inter-Association Committee on Health[1] inserted in the record immediately following the testimony.

On behalf of the Association may I thank you for this opportunity to appear.

1. Four statements adopted by the Inter-Association Committee on Health. J.A.D.A. 44:331 (March) 1952.

BUREAU OF LIBRARY AND INDEXING SERVICE

Additions to the library

The books and package libraries listed here have been added recently to the library collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing books but a rental fee of fifty cents should accompany requests for each package library. Most of these books may be purchased also through the Bureau. A list of package libraries covering 470 topics and of the books acquired by the Bureau since 1942 will be sent upon request.

BOOKS

AMERICAN DENTAL ASSOCIATION. COUNCIL ON DENTAL THERAPEUTICS. Accepted dental remedies. 17th ed. Chicago, American Dental Association, 1951. 211 p. $1.50.

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Hobbies of dentists
Radiation and nuclear physics
Roentgenology—long tube technic
Trichlorethylene

COUNCIL ON DENTAL THERAPEUTICS

Council announces classification of additional products

The classification of products by the Council on Dental Therapeutics of the American Dental Association has been described in a previous report (*J.A.D.A.* 40:489, April, 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration, the items conformed with the provisions of acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees and the House of Delegates of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies,* and may use the Seal of Acceptance, unless otherwise provided.

The following additional products are classified in Group A:

Gamophen (Hexachlorophene) Surgical Soap (Johnson & Johnson): A bar soap stated to contain 2 per cent hexachlorophene in a base consisting mainly of sodium stearate and sodium laurate.

Hexachlorophene Germa-Medica Liquid Surgical Soap (Huntington Laboratories): Stated to be a liquid preparation containing soap prepared from a mixture of olive oil and cocoanut oil, and 1 per cent of hexachlorophene.

Septisol with Hexachlorophene 0.75%, Antiseptic Liquid Soap (Vestal Laboratories, Inc.): A liquid preparation stated to contain 38 per cent of nonvolatile material consisting principally of soap and 2 per cent of hexachlorophene expressed in terms of these nonvolatile materials so that the actual concentration of hexachlorophene is between 0.73 to 0.76 per cent.

A Council report on detergents containing hexachlorophene appeared in *J.A.D.A.* 43:604, November, 1951.

Procaine HCl 4%, Neo-Synephrine HCl 1:2,500 (L. Silverman): Each cubic centimeter is stated to contain procaine HCl, 0.04 Gm.; phenylephrine HCl, 0.0004 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm.; and distilled water. Marketed in 2.2 cc. cartridges.

GROUP B

Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental Therapeutics and the Division of Chemistry. It is the Council's opinion that Group B products may be promoted for special use and study.

The following additional product is classified in Group B:

Aureomycin Hydrochloride[1] *(Crystalline) Pharyngets*[2] *15 mg.* (Lederle Laboratories Division, American Cyanamid Company): Stated to contain aureomycin hydrochloride crystalline powder in a flavored and colored base. (For report, see *J.A.D.A.* 42:65, January, 1951.)

GROUP C

Listings of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

GROUP D

Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

1. Patented. Patent No. 2,482,055. See A.D.R. ed. 17, p. iv.
2. Trademark.

COUNCIL ON DENTAL HEALTH

Schedule of activities for 1952 for Council on Dental Health

In the first of its three 1952 meetings in the Central Office, the Council on Dental Health organized its projects for the current year, heard reports on assignments now in progress and reviewed health education materials, including new films. Presiding was David W. Brock, of St. Louis, chairman of the Council.

As a regular part of its work, the Council conducts studies of various dental health problems and presents its findings and recommendations to the Board of Trustees and House of Delegates. Some studies extend for a period of several years, and the projects in which the Council is presently engaged were reported as follows:

1. Dental care plans for organized groups.

The Council will continue its investigations of existing and proposed dental

health programs of organized groups such as labor unions. One of the main purposes of the study will be to formulate standards for such programs to assist representatives of the dental profession in negotiating with labor unions, farm cooperatives and other organized groups.

2. Prepayment plans.

In 1945, the Council published a report[1] in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION pointing out the need for basic information to determine the possibility of applying the prepayment principle to dentistry. Although an experimental dental prepayment plan suggested in the report has not been put into operation, the Council will continue to study all available data to determine the practicability, costs and potential benefits of a prepayment plan for dental care.

3. Dental services in industrial hygiene programs.

The purpose of this project is to review previous actions of the Council and the House of Delegates with regard to dental services in industrial hygiene programs. The objectives are to define industrial dental health services and to formulate principles and standards for programs.

4. Survey of existing industrial dental health programs.

The Council is collecting information on industrial dental health programs now in operation. A report on data collected will be published in THE JOURNAL.

5. Basic dental health services of local and state health departments.

The purpose of this project is to review the dental health services now being provided by local and state health departments and to formulate recommendations for basic dental health services of such departments.

6. Earmarked federal funds for dental health programs.

The Council is studying a request from the American Association of Public Health Dentists that the American Dental Association initiate or sponsor a grants-in-aid bill in the federal Congress through which funds for state dental health programs would be earmarked. During its January meeting, the Council concurred with the opinion of the Council on Legislation that the American Dental Association should not sponsor a grants-in-aid bill for dental health programs at present, but that the Association should support the request of the Public Health Service for an appropriation for fluoridation which presently is included in the federal budget.

7. Present status of studies on the relationship of the periodontal pocket to systemic disease and the etiology of malocclusion.

This study project is being conducted by faculty members of the University of Minnesota School of Dentistry under the leadership of David F. Mitchell. The final report is expected to be available before the end of 1952.

The Council is preparing an exhibit on fluoridation for the International Dental Congress to be held in London July 19-26. The subject was requested by representatives of the British Dental Association because of the great interest in foreign countries in fluoridation.

Plans were developed for conferences with representatives of Blue Cross and Blue Shield and with state dental directors, each group to participate in one of the two subsequent 1952 sessions of the Council. Plans were discussed also for the annual Dental Health Conference to be held September 6 in St. Louis prior to the ninety-third annual session of the American Dental Association.

Publications scheduled for production by the Council in 1952 include the *1952 Catalog of Education Materials,* the *1953 Appointment Book,* a booklet on planning community dental health pro-

1. Council on Dental Health. Recommendations for experimental prepayment dental plan. J.A.D.A. 32:194 (Feb.) 1945.

grams, a leaflet on fluoridation, a pamphlet on periodontal diseases, comic book no. 2, *Daredevil Davey Conquers Space,* a poster for the 1953 National Children's Dental Health Day and the compilation of a kit of materials on fluoridation. In addition, there will be periodic revision of all existing dental health education materials and monthly publication of the Council *News Letter.*

Reports for 1952 were received from a number of state councils on dental health. Those not having submitted reports were urged to do so for inclusion in the summary report to be published in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

The three following motion pictures were previewed and approved by the Council:

"Target: Tooth Decay," was produced by the division of preventive dentistry of the Oklahoma State Department of Health of which Frank P. Bertram is director. Purchase price to members of the American Dental Association: color, $56; black and white, $28. Inquiries are to be directed to the University of Oklahoma, Norman, Okla.

"Picture Your Teeth," was produced by Eastman Kodak Company and its availability will be announced later.

"The Fluoridation Story," 3 minutes, color or black and white, was produced by U. S. Public Health Service. It can be used on television and is available through state health departments.

Dental health education material to be produced by the Bristol-Myers Company was reviewed as was the dental health content of a dental health teaching outline for nurses in training.

A resolution was approved urging state dental societies to develop a working relationship with state committees of the American Dental Hygienists' Association in promoting public health activities.

COUNCIL ON DENTAL RESEARCH

Product added to the A.D.A. list of certified dental materials

Since the publication of the most recently revised List of Certified Dental Materials (J.A.D.A. 43:78, July 1951; 43:495, October 1951; 44:81, January 1952 and 44:326, March 1952) the following material which conforms to American Dental Association Specification No. 11 has been added:

CERTIFIED HYDROCOLLOIDAL IMPRESSION MATERIALS—AGAR TYPE (A.D.A. SPECIFICATION NO. 11)

Material	*Manufacturer or Distributor*
Elastic Colloid	The S. S. White Dental Mfg. Co.

COUNCIL ON DENTAL EDUCATION

List of approved hospital dental internship and residency educational programs, March, 1952

The Council on Dental Education evaluates hospital internship and residency educational programs and approves such hospital educational programs as meet the requirements approved by the House of Delegates. The Council on Dental Education maintains a list of approved educational programs. The following list includes the names of hospitals with approved programs published previously in addition to those approved by the Council on Dental Education at its February, 1952, meeting in Chicago.

Hospital	Type of training approved: Internships	Residencies
Alabama		
Jefferson-Hillman Hospital, 612 So. 19th St., Birmingham Joseph F. Volker, D.D.S., Dental Administrator	x	x
California		
Letterman Army Hospital, San Francisco Marhl H. Welch, DC, D.D.S., Chief, Dental Service	x	x
U. S. Marine Hospital, San Francisco W. Y. Hollingsworth, M.D., Hospital Administrator F. R. Jackson, D.D.S., Dental Director	x	
U. S. Naval Hospital, Long Beach Capt. F. C. Hill, MC, USN, Superintendent Cmdr. J. V. Bancroft, DC, USN, Chief of Dental Staff	x	
U. S. Naval Hospital, Oakland Rear Adm. C. A. Broaddus, MC, USN, Commanding Officer W. N. Van Zile, D.D.S., Chief, Dental Service	x	
U. S. Naval Hospital, San Diego Capt. R. D. Mackey, MC, Administrator R. W. Taylor, D.D.S., Chief, Dental Service	x	
Colorado		
Fitzsimons General Hospital, Denver Brig. Gen. O. H. Quade, Administrator Col. J. M. Epperly, DC, Chief of Dental Staff	x	
Connecticut		
Hartford Hospital, 20 South Hudson Street, Hartford Wilmar M. Allen, M.D., Director Wilson R. Conran, D.D.S., Chairman, Department of Dental Surgery	x	
Norwich State Hospital, Norwich Riley H. Guthrie, M.D., Superintendent T. J. McCormick, D.D.S., Director of Dental Department	x	

Hospital	Type of training approved: Internships	Residencies
St. Mary's Hospital, 56 Franklin Street, Waterbury Bernard A. O'Hara, D.D.S., Chief, Dental Department	x	
Waterbury Hospital, 64 Robbins Street, Waterbury Charles V. Wynn, Hospital Administrator I. E. Wallace, D.D.S., Chairman, Service of Dentistry	x	
District of Columbia		
Central Dispensary and Emergency Hosp., 1711 New York Avenue, Washington, D. C. Harold Krogh, D.D.S., Chief, Oral Surgery	x	
Episcopal Eye, Ear and Throat Hospital, 1147—15th Street, Washington, D. C. Harold Krogh, D.D.S., Chief, Dental Department	x	
Gallinger Municipal Hospital, 19th and C Streets, S.E., Washington, D. C. Phillip O. E. Stebbing, Hospital Administrator Arthur Merril, D.D.S., Chief Dentist	x	
George Washington University Hospital, 901 23rd Street, Washington, D. C. K. H. Wood, D.D.S., Chief, Department of Oral Surgery		x
St. Elizabeth's Hospital, Nichols Avenue, Washington 20, D. C. E. B. Frank, D.D.S., Chief, Dental Department	x	
Walter Reed General Hospital, Butternut Street and Georgia Avenue, Washington 12, D. C. Col. Neal A. Harper, DC, D.D.S., Chief, Dental Service	x	x
Florida		
Florida State Hospital, Chattahoochee J. H. Therrell, LL.D., Hospital Administrator A. F. Douglas, D.D.S., Chief Dentist	x	
Georgia		
Oliver General Hospital, Augusta Col. Hew B. McMurdo, M.D., Administrator Col. Edward C. Alley, DC, Chief, Dental Staff	x	
Illinois		
The Carle Foundation Operating the Carle Memorial Hospital, 602 West University Avenue, Urbana Russell Duncan, Administrator Edward C. Thompson, D.D.S., Chief of Staff	x	x
Children's Memorial Hospital, 707 Fullerton Avenue, Chicago Gordon H. Rovelstad, D.D.S., M.S.D., Director, Dental Department		x
U. S. Marine Hospital, Chicago 13 E. W. Blatter, M.D., U.S.P.H.S., Medical Officer in Charge J. E. Unsworth, D.D.S., Chief, Dental Department	x	
U. S. Naval Hospital, Naval Training Center, Great Lakes Captain J. F. Hooker, MC, Administrator F. C. Snyder, D.D.S., Chief, Dental Service	x	

Hospital	Type of training approved: Internships	Residencies
University of Chicago Clinics, University of Chicago, 950 East 59th Street, Chicago 37 Ray Brown, Administrator J. R. Blayney, D.D.S., Director, Dental Clinic	x	
Indiana		
Indianapolis General Hospital, 960 Locke Street, Indianapolis Charles W. Myers, M.D., Administrator J. Thayer Waldo, D.D.S., M.D., Chief, Oral Surgery Department	x	x
Kansas		
University of Kansas Hospital, 39th and Rainbow Boulevard, Kansas City 3 Charles B. Newell, Administrator Ralph W. Edwards, D.D.S., Director, Dental Service	x	
Kentucky		
Louisville General Hospital, 323 East Chestnut, Louisville J. B. Buschemeyer, Hospital Administrator Richard H. Herd, D.D.S., Chief, Oral Surgery	x	x
Louisiana		
U. S. Marine Hospital, 210 State Street, New Orleans 15 E. H. Carnes, M.D., Hospital Administrator L. R. Etzenhouser, D.D.S., Chief, Dental Section	x	
Maryland		
Sinai Hospital of Baltimore, Inc., 1714 East Monument Street, Baltimore 5 H. H. Weiss, Hospital Administrator A. H. Bermon, D.D.S., Director, Dental Surgery	x	x
U. S. Marine Hospital, Wyman Park Driveway and 31st Street, Baltimore J. F. Van Ackeren, M.D., Hospital Administrator R. S. Lloyd, Chief, Dental Service	x	
U. S. Naval Dental School, National Naval Medical Center, Bethesda 14 Rear Adm. M. D. Willcutts, MC, Administrator Capt. L. D. Mitchell, Jr., DC, D.D.S., Dental Officer in Command	x	
Massachusetts		
Beth Israel Hospital, Boston Charles F. Wilensky, Executive Director Henry M. Goldman, D.M.D., Dental Director	x	
Boston City Hospital, 818 Harrison Avenue, Boston James W. Manary, M.D., Superintendent Stephen P. Mallett, D.M.D., Chief, Dental Staff	x	x
Children's Hospital, 300 Longwood Avenue, Boston 15 Stanton Garfield, M.D., Administration Head Paul K. Losche, D.D.S., Chief, Division of Dentistry	x	

Hospital	Type of training approved: Internships	Residencies
U. S. Marine Hospital, Brighton, Boston 35 K. R. Nelson, M.D., Medical Officer in Charge Howard J. Woodbridge, D.D.S., Chief, Dental Service	x	
U. S. Naval Hospital, Chelsea Capt. L. R. Newhouser, M.D., USN, Administration Head Stanley W. Brown, D.D.S., DC, USN, Chief, Dental Service	x	x
Worcester City Hospital, Worcester 3 Huston K. Spangler, M.D., Administrator James H. Maycock, D.D.S., Chief, Oral Surgeon	x	x
Michigan		
Percy Jones General Hospital, Battle Creek Col. Robert M. Hardaway, Administrator Col. George Perkins, DC, Chief, Dental Staff	x	
Missouri		
Kansas City General Hospital No. 1, 24 Cherry Street, Kansas City E. H. Stratemeier, M.D., Medical Superintendent Don E. Woodard, D.D.S., Chief, Dental Staff	x	x
New Jersey		
Medical Center, 50 Baldwin Avenue, Jersey City George O'Hanlon, M.D., Medical Director E. B. Zlonczewski, D.M.D., Dental Director	x	x
Monmouth Memorial Hospital, 3rd and Pavilion Avenues, Long Branch Charles B. Allen, Administrator A. G. Hoyt, D.D.S., Director, Dental Department	x	x
Newark City Hospital, 116 Fairmount Avenue, Newark 7 J. Crecca, D.D.S., Director, Dental Department	x	
North Hudson Hospital, 4300 Park Avenue, Weehawken J. Lawrence Evans, Administrator Morris J. Boyer, D.D.S., Chief, Dental Department	x	
New York		
Buffalo General Hospital, 100 High Street, Buffalo 3 Fraser D. Mooney, Hospital Administrator Bernard G. Wakefield, D.D.S., Chief, Dental Service	x	x
Grasslands Hospital, Valhalla Edwin L. Harmon, M.D., Director Byron H. Weeth, D.D.S., Chief Dental Staff Morris Eckhous, D.D.S., Attending Dentist	x	x
Harlem Hospital, 136th Street and Lenox Avenue, New York Emanuel Lifschultz, M.D., Administrator T. H. Walters, D.D.S., Chief, Oral Surgery	x	x
Hospital for Joint Diseases, Madison Avenue and 123rd Street, New York J. J. Golub, M.D., Administrative Head Adolph Berger, D.D.S., Attending Dental Director	x	

Hospital	Type of training approved: Internships	Residencies
Jewish Sanitarium and Hospital for Chronic Diseases, 86 East 49th Street, Brooklyn Arthur Feigenbaum, Superintendent Leonard Kohn, D.D.S., Director, Dental Department	x	x
Lenox Hill Hospital, 111 East 76th Street, New York City John Hayes, Administrative Head Fred S. Dunn, D.D.S., Attending Oral Surgeon	x	
Lincoln Hospital, 320 Concord Avenue, New York 54 Bernard B. Nadell, M.D., Medical Superintendent M. Hillel Feldman, D.D.S., Director, Dental Services	x	
Meadowbrook Hospital, Box 108, Hempstead W. F. Harrigan, M.D., D.D.S., Chief, Dental Service	x	
Metropolitan Hospital, Welfare Island, New York I. Herbert Scheffer, M.D., Medical Superintendent Malcolm W. Carr, D.D.S., Director, Dental Department	x	x
Montefiore Hospital, Gun Hill Road, New York 67 E.M. Bluestone, M.D., Administrative Head David Tanchester, D.D.S., Chief, Dental Service	x	x
Mount Sinai Hospital, 5th Avenue and 100th Street, New York 29 Martin H. Steinberg, M.D., Hospital Administrator Leo Stern, D.D.S., Attending Oral Surgeon	x	
New York Medical College, Flower and 5th Avenue Hospital, 1 East 105th Street, New York 29 J. A. W. Hetrick, M.D., Administrator John J. O'Keefe, D.D.S., Director, Dental Department	x	x
New York Polyclinic Medical School and Hospital, 345 West 50th Street, New York 19 A. A. Jaller, Executive Officer M. W. Carr, D.D.S., Director, Division of Dentistry	x	
St. Luke's Hospital, 431 West 113th Street, New York 25 M. W. Carr, D.D.S., Attending Oral Surgeon	x	
U. S. Marine Hospital, Stapleton, Staten Island, New York 4 R. H. Moore, D.D.S., Chief, Dental Service	x	
U. S. Naval Hospital, St. Albans, L. I. 12 Capt. W. H. Turville, MC, Administrative Head John A. Walsh, DC, Chief, Dental Department	x	
North Carolina		
North Carolina Baptist Hospital, 300 South Hawthorne Road, Winston-Salem Reid T. Holmes, Administrator J. Conrad Watkins, D.D.S., Professor, Periodontia and Oral Surgery	x	
Ohio		
Cleveland City Hospital, Cleveland P. J. Aufderheide, D.D.S., Chief, Dental Surgery	x	
Mt. Sinai Hospital of Cleveland, 1800 East 105 Street, Cleveland Edward Reiter, D.M.D., Chief, Department, Oral Surgery	x	x

Hospital	Type of training approved: Internships	Residencies
U. S. Marine Hospital, Cleveland H. G. Trautman, D.D.S., Senior Dental Surgeon J. W. Holt, D.D.S., Chief, Dental Staff	x	
Youngstown Hospital Association, Oak Hill and Francis Streets, Youngstown W. T. James, D.D.S., Dental Administrator H. E. Kerr, D.D.S., Chief, Dental Staff	x	
Pennsylvania		
Children's Hospital of Pittsburgh, 125 De Soto Street, Pittsburgh Philip H. Lantz, Superintendent Clarence W. Hagan, D.D.S., Chief, Dental Service	x	x
Elizabeth Steel Magee Hospital, Forbes and Halket Streets, Pittsburgh Jessie Turnbull, R.N., Superintendent W. Harry Archer, D.D.S., Chief, Dental Department	x	x
George F. Geisinger Memorial Hospital, Danville William L. Wilson, Administrator James B. Smith, D.D.S., Director, Dental Department	x	x
Philadelphia General Hospital, Philadelphia 4 P. F. Lucchesi, M.D., Superintendent John H. Gunter, M.D., D.D.S., Chief of Dental Staff J. R. Cameron, D.D.S., Chief, Oral Surgery Service	x	x
St. Francis Hospital, 45th Street, Pittsburgh 1 Sister M. Thomasine, Administrator R. J. Englert, D.D.S., Chief, Dental Staff	x	
U. S. Naval Hospital, 17th Street and Pattison Avenue, Philadelphia 45 Capt. H. A. Montgomery, M.C., Administrator J. L. Purcell, D.D.S., Chief, Dental Service	x	x
Western State Psychiatric Institute and Clinic, 3811 O'Hara Street, Pittsburgh G. B. Pearson, M.D., Administrative Head W. Harry Archer, D.D.S., Chief, Dental Department	x	x
Rhode Island		
Rhode Island Hospital, Eddy Street, Providence Oliver G. Pratt, Hospital Administrator George H. Denicourt, D.M.D., Chief, Dental Department	x	
Tennessee		
Knoxville General Hospital, Knoxville 17 Harry Underwood, D.D.S., Chief, Oral Surgery	x	x
Texas		
Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston Col. Arthur R. Gaines, MC, Commanding Officer C. P. Conby, D.D.S., Dental Chief	x	

Hospital	Type of training approved: Internships	Residencies
Virginia		
U. S. Marine Hospital, Larchmont, Norfolk William C. Neaf, D.D.S., Senior Dental Surgeon	x	
U. S. Naval Hospital, Portsmouth J. B. Bancroft, D.D.S., Chief, Dental Service	x	
Washington		
U. S. Marine Hospital, P.O. Box, 3145, Seattle 14 George E. Jones, D.D.S., Senior Dental Director	x	

APRIL 1952

LON W. MORREY, D.D.S., EDITOR
VOLUME 44 • NUMBER 4
Published by the American Dental Association
222 East Superior Street • Chicago 11, Illinois

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

Editorials

Verdict in Seattle: referendum on fluoridation

The citizens of Seattle, Washington, have decided that they do not want to fluoridate their public water supply at the present time by a vote of 86,230 to 44,814. The dental profession views the outcome of this referendum with some concern but not with alarm.

The lack of alarm arises out of the belief that the scientific evidence is so overwhelming in favor of the fluoridation process that it ultimately must prevail against the vague and vapid generalizations of those who oppose it. The automobile, the railroad and the airplane are here to stay in spite of those who decried their introduction as the dangerous weapons of an undesirable modernity. Seattle voted to espouse the horse.

The lack of alarm is also reinforced because of the dental profession's traditional attitude that the local determination of need and local control are two of the most important elements of a productive health program. The fact that Seattle voted against fluoridation while more than 200 other communities have adopted the procedure is illuminating, but it does not invalidate the principle of local determination and control. It is a part of the democratic process that people and cities have the right to make up their own minds even if, as in Seattle, they prefer to take the short view.

The dental profession, however, must have concern with the discharge of its own obligation to provide guidance and leadership in those problems where technical

dental knowledge and training are essential to decision. The Washington State Dental Association, the Seattle District Dental Society, the central council of the King County Medical Society and a host of other organizations competent to have an opinion in this field did make strenuous efforts to explain the mass of scientific evidence which demonstrates the safety and efficacy of the fluoridation process. The continuing concern of the dental profession and of the groups joined with it must be to persist in this effort to provide guidance on the technical aspects of the problem to the end that a more enlightened public will reconsider its denial of the benefits of this health measure to the children of Seattle.

The dental profession also has reason to be concerned because the Seattle referendum proves that it is possible to remove a problem, like fluoridation, from the scientific field to the realm of politics where every crackpot emotion can be exploited without the necessity of demonstration or proof. Such a transfer unhappily places on the general public an unnecessarily heavy burden since the average citizen is asked to decide, by vote, matters which go well beyond his course in first aid and his text in high school chemistry. The referendum in Seattle proved conclusively that the rumor and the guess can frequently outdistance the figure and the fact. All of those interested in the improvement of dental health must be concerned with the necessity of placing more facts before the public.

As always in such a contest, there are interesting sidelights. One of the proponents of fluoridation, the Seattle Committee for Fluoridation, issued a leaflet which contained the names of more than 90 citizens of Seattle. One of the opponents, the Washington State Council Against Fluoridation, also issued a leaflet but this one contained not a single name and indicated sponsorship only by something called the National Nutrition League, Inc.

It is interesting to note also that fluoridation in Seattle was sponsored by the Seattle District Dental Society, the Board of Trustees of the King County Medical Society, the Seattle-King County Health Department, Seattle Health and Welfare Council, Seattle P.T.A. Council and Seattle Dietetics Association. On the national scene, fluoridation has been declared to be practicable, safe and effective by the American Dental Association, the American Medical Association, the American Public Health Association, the United States Public Health Service, the National Research Council, the American Waterworks Association and the Inter-Association Committee on Health composed of the representative national groups for nursing, medicine, hospitals, public health, public welfare and dentistry.

It is a drab commentary on the effectiveness of modern publicity and information methods to know that the opinions of the organizations listed above were effectively outmatched by the National Nutrition League, Inc., the anonymous Washington State Council Against Fluoridation and agencies of similar stature. The Washington Council Against Fluoridation supported its case in Seattle with a quotation from one Royal L. Lee, a dentist and director of another something called the Lee Foundation for Nutritional Research, whose "book on 'Photomorphology' or principle of cell suto-regulation [sic], easily qualifies him as an outstanding authority in Bio-Chemistry."[1] Lee complains that the addition of fluoride to the water is comparable to the use of food adulterants which "the Supreme Court once eliminated by their [sic] decision, but where the profit incentive was strong enough to abort prosecution and enforcement of the law."

Lee should know about these things, especially prosecution and the profit incentive because, trading as the Vitamin Products Co., Milwaukee, Lee was found guilty and fined $800 for misbranding a product claimed to be effective in 41 diseases

and conditions including "weakness in hot weather," "sensitivity to bright light," "falling hair," "brittle nails" and "restless sleep."[2] It is difficult to see how "expert testimony" of this type could influence either the most gullible or the most indifferent, yet most of the statements made by the crusaders against fluoridation exploit the same brand of gibberish.

It would be amusing, but not productive, to compile a catalog of the many irrational charges that are being used against fluoridation: "arterial and venous hardenning," "undue financial anxiety," "loss of memory," "satyriasis," "hastens tooth decay," "nymphomania" and, worst of all, "socialism." Such charges have been a part of almost every program to introduce new public health measures particularly in immunization and in the chlorination of water supplies.

It is a part of the American heritage to allow anyone to air his opinion—stupid and irrational though it may be. It remains for those who want this heritage to continue—not only in terms of free speech but also in terms of improved dental health—to get on with their job of seeking and publishing the fact. The safety and efficacy of fluoridation have withstood exhaustive and painstaking analysis. Surely this public health measure can weather the noises of the fringe groups and even, occasionally, the misunderstanding of the voting public.

1. Vote against fluoridation of our Seattle water supply. Seattle, Washington State Council Against Fluoridation, p. 6.

2. Notices of Judgment Under the Federal Food, Drug & Cosmetic Act. Washington, D. C., Federal Security Agency, Food and Drug Administration, May, 1950, p. 512.

Old age and survivors insurance and the A.D.A. relief fund

The annual American Dental Association Relief Fund campaign is not likely to reach its quota of $100,000 this year in spite of the fact that 19 constituent societies have generously reached or surpassed their quotas. Less than one half of the members of the Association have contributed and, in addition, the Relief Fund has been penalized by those who managed to create a link between a contribution to the Relief Fund and the House of Delegates' position on the inclusion of dentists under the Old Age and Survivors Insurance (OASI) provisions of the federal Social Security Act. A number of letters has been received from dentists who state that a contribution is being withheld on the ground that the need for the Relief Fund would disappear if dentists were beneficiaries of the federal social security program.

No one will quarrel with an individual dentist's right not to contribute because the Relief Fund, since its establishment, has taken great pride in the fact that it represents the voluntary contributions of dentists for the aid of their needy colleagues. It is fallacious, however, to refrain from contributing on the ground that the needy members of the profession and their dependents would be better served if dentists were included under OASI.

First, the Relief Fund is caring for needs at the present time when dentists are not covered by OASI and contributions are needed to support this relief program. Second, this philosophy represents the all-too-common one of turning to the federal government whenever there is a task which requires a little effort and sacrifice on the part of the individual and the community. It involves the contradiction of seeking federal aid for this and that and then complaining about the size of the federal tax bill. Third, a large majority of the dentists now receiving benefits from the Relief Fund, even though covered by OASI, would not have their needs met. Does OASI provide funds for the middle-aged dentist stricken with tuberculosis? Does OASI provide funds for the wife and children of a dentist stricken with multiple sclerosis? Does OASI provide benefits to a dentist under 75 who chances to have desperately needed income beyond the permissible fifty dollars per month? Does OASI pay rent and support the family of a young dentist during catastrophic illness against the day when he can return to active practice and his place in society? Does OASI keep life insurance in force so as to keep the surviving widow and children from dependency? Does OASI provide funds for the exceptional emergency which may arise in the case of serious illness or death?

If the answer to all of these questions is "no"—and it is—OASI can never do the job that the Relief Fund does and will continue to do. And, what is more, it shouldn't.

Members urged to cooperate in nation-wide survey of dental needs

During the early part of May the Bureau of Economic Research and Statistics of the Association will initiate a nation-wide survey of dental needs in the United States. Approximately one third of the practicing dentists in the country will be mailed questionnaires and requested to cooperate by supplying information regarding the dental condition of a limited number of adult and child patients. An explanation of the nature of the survey and the manner in which it will be conducted is published on page 463 of this issue of THE JOURNAL.

Twelve years have elapsed since a similar survey of the dental needs of the nation was made by the Association. The information obtained then was extremely valuable, but now is obsolete. The current survey will bring the data to date, enable members of the profession and other health workers to determine dental health progress during the last decade and provide a basis for future planning and development by the profession.

Dentists who receive the questionnaires are requested to fill them out and return them promptly to the Bureau of Economic Research and Statistics. The success of the survey will depend largely on the cooperation of those members of the profession who are asked to participate.

Washington News Letter

What Congress does—or doesn't do—in these next few weeks will have an important bearing on the future of water supply fluoridation. Late in April, a special House investigating committee is scheduled to publish its report and may submit recommendations on fluoridation. Of greater and more immediate importance, Congress soon will decide whether federal funds are to be appropriated to the States for technical assistance in launching fluoridation programs.

DELANEY COMMITTEE REPORT

There will be no teeth in the report being prepared by the House Select Committee to Investigate the Use of Chemicals in Foods and Cosmetics, of which Rep. James J. Delaney (D., N. Y.) is chairman. Even though legislation of some sort may be recommended, likelihood of its enactment is remote.

On the other hand, the report's conclusions may influence the Public Health Service budget for the fiscal year beginning July 1, 1952. If the committee reports any adverse observations on fluoridation, it will decrease prospects on an allocation of funds to the states for technical assistance in fluoridation. Pointing up this possibility is the fact that Rep. E. H. Hedrick (D., W. Va.), a member of the Delaney committee, is also a member of the powerful appropriations subcommittee that decides the size of the Public Health Service budget.

A distinguishing feature of the public hearings on fluoridation conducted in February and March by the Delaney committee was the obvious attempt by certain of its members to depreciate expert testimony presented in support of this anti-caries procedure. On the contrary, witnesses who spoke in opposition met with no aspersions on their professional qualifications, and their questioning was tinged with none of the sarcasm reserved for proponents. The latter included J. Roy Doty of the American Dental Association, John D. Porterfield of the Association of State and Territorial Health Officers, Francis F. Heyroth of the National Research Council, David B. Ast of the American Public Health Association, and such federal dental researchers as H. Trendley Dean and Francis A. Arnold.

USPHS BUDGET HEARINGS

Appearing recently before the appropriations subcommittee in behalf of the American Dental Association, E. Harold Gale and Francis J. Garvey urged the approval of a $250,000 item for grants-in-aid to the states for furtherance of water fluoridation. They went further, in fact, recommending that the sum be fixed at $750,000, three times the figure recommended by the White House and Budget Bureau.

"The funds which are sought in this appropriation," Dr. Gale explained, "will be used by states to employ technical experts. These men will be available to local communities which need assistance in evaluating their own water supplies in relation to fluoridation. The funds will not be employed to purchase either equipment or material for actual operation. The Association believes that such cost is the responsibility of the citizens of the individual community.

"However, it is more efficient and more economical to provide a technical staff at the state level to serve as consulting experts on the problems which may arise than it is to set up such a staff in each individual community. Inquiries made by the Association among the states indicate that they neither have, nor expect to have, the funds made available from state sources to provide this service. Consequently, because of the widespread incidence of dental caries, the Association is willing to recommend that these initial funds be provided by the federal Government."

OTHER CAPITAL NEWS

Meanwhile, in an address to the 20th annual Postgraduate Clinic of the District of Columbia Dental Society on March 10, Association President LeRoy M. Ennis emphasized that the support of fluoridation by dental, medical and public health agencies is so strong and united that there is scarcely any alternative but to characterize opponents as either misguided or self-seeking.

In the National Capital, otherwise, preoccupation with politics is such that little is stirring in matters of particular interest to the dental profession.

Under the auspices of the President's Commission on the Health Needs of the Nation, a round table discussion of financial aid to professional schools was conducted on March 11. Participants included J. Ben Robinson, dean of the School of Dentistry, University of Maryland, and Francis J. Garvey, secretary of the American Dental Association's Council on Legislation. Arguments for and against federal assistance were aired at the session, though it was generally agreed that the present Congress will pass no legislation on this subject.

Public hearings were opened by a subcommittee of the Senate Expenditures Committee on pending legislation that would set up a Department of Health in the President's Cabinet, but chances of enactment are concededly nil. However, the proposal is expected to be revived when a new Congress is convened next January.

MILITARY COMMISSION BILL

A bill that would authorize Army, Navy and Air Force to commission women physicians and dentists on same basis as men has made some headway on Capital Hill and its passage before adjournment has better than an even chance, observers believe. At present, women's military status is obscure and the bill, if enacted, would provide for uniform commissionings in the three armed services and produce an incentive to women to embark upon military careers.

Association Affairs

HOUSE COMMITTEE HEARS TESTIMONY ON FLUORIDATION

The Select Committee to Investigate the Use of Chemicals in Foods and Cosmetics closed its hearings on the fluoridation of public water supplies March 6, after pro-fluoridation testimony had been presented by a procession of nationally-known scientists.

J. Roy Doty, secretary of the American Dental Association's Council on Dental Therapeutics, testified that the safety of fluoridation of community water supplies has been proved beyond any reasonable doubt.

Others who stressed the harmlessness of the measure, as well as its benefits, in testimony received by the committee were Bruce D. Forsyth and John W. Knutson of the U. S. Public Health Service, H. B. Andervont of the National Cancer Institute, H. Trendley Dean and Francis A. Arnold of the National Institute of Dental Research, John D. Porterfield of the Association of State and Territorial Health Officers, David B. Ast of the American Public Health Association, George F. Lull of the American Medical Association and Francis F. Heyroth of the National Research Council.

Witnesses who commented unfavorably on fluoridation included Alfred Taylor of the University of Texas Biochemical Institute and V. O. Hurme of the Forsyth Dental Infirmary for Children.

During the hearings, which opened February 18, a few committee members showed hostility toward fluoridation. At one session, however, other members publicly reprimanded their counsel for his "prosecution" of witnesses who favored fluoridation.

The committee, which has been investigating food adulteration during its 18 months of existence, is expected to make a report later this month.

52,841 MEMBERS PAY DUES PROMPTLY, SET RECORD

By the end of February 52,841 dentists had paid their 1952 membership dues in the American Dental Association. This membership total set an all-time high for the first two months of the year.

Dentists whose membership dues were not received by April 1 have been cancelled from subscription lists of THE JOURNAL. Their other membership benefits have also been terminated. Society secretaries are requested to send the dues to the Association as promptly as possible when they receive them from members.

SURVEY TO MEASURE EXTENT OF DENTAL PATIENTS' NEEDS

In cooperation with 25,000 selected dentists throughout the country, the Association's Bureau of Economic Research and Statistics will conduct a survey next month on the needs of the nation's dental patients.

Questionnaires will be sent to a cross section of the profession in the United States. These 25,000 dentists will be asked to fill out reports on 10 consecutive patients who visit them on a specific day, listing each patient's number of fillings, dentures, extractions and other dental operations and treatment required.

The survey is expected to show how the dental needs of the average dental patient differ from the needs in 1940, when a similar survey was conducted.

The local committee on arrangements for the American Dental Association's forthcoming 93rd annual session in St. Louis met recently with members of the Central Office staff. Shown at the meeting are (seated, l. to r.) David W. Brock, vice-chairman of local arrangements; Mrs. Earl C. Bean, chairman of women's entertainment; Harold Hillenbrand, secretary of the Association; Henry

Patients will be classified according to age, sex, approximate income level and the population of the community in which they reside. For the first time, children will be included, with a view to providing a basis for future measurement of benefits derived from fluoridation and other dental measures recently introduced.

The results of the survey will be published serially in THE JOURNAL, beginning in the fall.

F. W. HERBINE NAMED TO DIVISION OF USPHS

Frederick W. Herbine of Reading, Pa., chairman of the Council on Dental Trade and Laboratory Relations, recently accepted an appointment as representative of the American Dental Association in the U. S. Public Health Service's Division of Civilian Health Requirements. Dr. Herbine's appointment was announced by Leonard A. Scheele, Surgeon General of the USPHS.

NEW MANUAL TO APPLY RULES OF TESTING TO DENTISTRY

Advance copies of a manual on testing, "which summarizes some of the most important principles and concepts of good testing procedures," were distributed recently to the deans of dental schools by the Association's Council on Dental Education and the Council of the National Board of Dental Examiners.

The manual, being prepared by Shailer Peterson, secretary of the Councils, makes use of examples and illustrations furnished by consultants and advisers of both Councils as well as by members of boards of dental examiners and dental school teachers. The only manual of this type, it summarizes the basic and most important principles of good test construction and makes use of illustrations that apply directly to dentistry. It is designed to help dental educators and state licensure examiners to build effective examinations.

Although the monograph is not yet completed, Council spokesmen believe

F. Westhoff, general chairman of local arrangements; Otto W. Brandhorst, president-elect of the Association; Mrs. E. E. Shepard, vice-chairman of women's entertainment; and R. H. Miller, vice-chairman of local arrangements.

Standing are: Alva N. Blaney, chairman of publicity; Earl J. Poe, vice-chairman of entertainment; Joseph V. Kirby, vice-chairman of information; James Brophy, executive secretary of the St. Louis Dental Society; John M. Marre, vice-chairman of the convention hall; J. J. Hollister, business manager of the Association; Walter Suberg, assistant business manager; Phil G. Vierheller, chairman of entertainment; Max Kornfeld, vice-chairman of local arrangements; Frank A. Strake, chairman of reception; Louis M. Cruttenden, assistant secretary of the Association; Ralph Rosen, vice-chairman of publicity, and Frank W. Jaeger, chairman of convention hall.

Absent were Oliver F. Steber, vice-chairman of local arrangements; George A. Clipner, chairman of information, and A. Frank Schopper, vice-chairman of reception.

that the final chapter will be finished within the next few months and that systematic distribution to Council consultants, dental schools and state boards will then begin.

ANNUAL DIRECTORY TO REPLACE 3-YEAR ISSUE, SUPPLEMENTS

The *American Dental Directory*, heretofore issued every third year, will be published annually beginning next December 1, it was announced recently by Harold Hillenbrand, secretary of the Association. The quarterly cumulative supplements to the *Directory* will be discontinued, effective with the current March issue, the announcement reported.

These changes have been effected to bring better directory information to a greater number of Association members, Dr. Hillenbrand announced. Refund checks will be issued to members who subscribed to the supplement service for 1952.

Information to be included in the next *Directory* must be received in the Central Office by June 1. Dentists whose membership dues for 1952 have not been received in the Central Office by that time will not be listed as members in the 1953 *Directory*.

The current supplement lists all changes in members' residence and practice reported to the Association since the 1950 *Directory* was published. Copies of the current supplement may be purchased for $10 from the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

RELIEF FUND CONTRIBUTIONS TOP $89,500 BY MARCH 15

Contributions to the 1951-52 Relief Fund of the American Dental Association totaled $89,553.08 on March 15, an increase of more than $4,000 over contributions on the same date last year. Less than $10,500 is now needed to reach the goal of $100,000.

Dentists of Delaware, the District of Columbia, Idaho and the Air Force have exceeded their goals since the last issue of THE JOURNAL. The 16 other state societies which have contributed more than their quotas are Alabama, Alaska, Southern California, Georgia, Hawaii, Indiana, Maryland, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, Oregon, Tennessee, Washington and Wyoming.

FIVE ESSAYISTS TO REPORT AT NOMENCLATURE CONFERENCE

Five reporters will deliver papers on "Concepts Pertaining to Occlusion" at the two-day conference on dental nomenclature, to be held June 20-21 at the Central Office.

The five essayists will be Carl O. Boucher of Columbus, professor of dentistry, prosthetics department of Ohio State University dental school and editor of the *Journal of Prosthetic Dentistry;* Paul E. Boyle, professor of oral histology and pathology, University of Pennsylvania dental school; Albert A. Dahlberg, dentist and anthropologist, American representative on the nomenclature committee of the Fédération Dentaire Internationale; T. M. Graber of Chicago, orthodontist and teacher of orthodontics at Northwestern University, and Orion H. Stuteville of Evanston, physician and dentist, of the department of maxillofacial surgery, Loyola University dental school.

Sponsored by the Bureau of Library and Indexing Service, the conference will be conducted by George B. Denton, research consultant in charge of the Association's nomenclature project.

Information may be obtained from Donald A. Washburn, director of the Bureau of Library and Indexing Service, 222 East Superior Street, Chicago 11.

PLANS FOR ASSOCIATION'S ANNUAL SESSION PROGRESS

Dentists who have material for table clinics have been invited to participate in the ninety-third annual session of the American Dental Association, September 8-11 in St. Louis. Clinicians are urged to send their names to the Council on Scientific Session, American Dental Association, 222 East Superior Street, Chicago 11.

The Council also announced recently that 18 dental organizations will hold meetings in conjunction with the Association's annual session.

The housing bureau, which opened in St. Louis in March, is now accepting applications for hotel accommodations during the annual session. Dentists who plan to attend the meeting have been requested to apply promptly for reservations by filling out the blank on page A-71 of this issue of THE JOURNAL.

All members of the American Dental Association are eligible to present films and exhibits during the ninety-third annual session.

Films and exhibits should portray some phase of diagnosis, treatment or research related to the improvement of health and dental practice.

Scientific exhibits will be divided among three groups: federal agencies; individuals; and institutions, associations and state and local governments.

Applications should be obtained before June 13 from Donald A. Washburn, director of scientific exhibits, American Dental Association, 222 East Superior Street, Chicago 11.

KIT ON FLUORIDATION COMPILED BY COUNCIL

An information kit on fluoridation has been prepared by the Council on Dental Health and has been distributed to officers of state health departments, members of the Council, constituent dental society councils and U. S. Public Health Service regional offices.

The kit contains articles, booklets and pamphlets explaining fluoridation; reprints of the Newburgh-Kingston study and other research reports; statements by the American Medical Association, National Research Council and Inter-Association Committee on Health; a folder of questions and answers on the health and technical aspects of fluoridation, and a compendium of "objections versus facts."

Although the distribution of the kit will be limited, one copy will be sent free of charge when requested by a component dental society or a community group engaged in the study of fluoridation. Additional copies may be obtained at $1.20 each, including postage, by writing to the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

INFORMATION KIT ON OASI PREPARED FOR STUDY CLUBS

An information kit on the Old Age and Survivors' Insurance (OASI) program has been distributed by the Association's Bureau of Public Information, to national officers, trustees, Council members and constituent and component dental societies.

The kit was compiled to aid the many local dental study groups which are investigating the question of whether dentists should be included in the OASI program of the Social Security Act. Included in the kit are pamphlets explaining the Act, articles on the "pros and cons" of the program, several reprints and a bibliography of works pertaining to the program.

Delegates to the 1952 annual session will vote on whether the Association should favor inclusion of dentists; no action was taken by the House of Delegates last year, as a survey conducted by the Council on Insurance showed that the opinions of dentists throughout the nation were about evenly divided on the question.

Additional packets will be distributed without charge to state and local dental societies upon the request of authorized officials. Requests may be sent to the Bureau of Public Information, American Dental Association, 222 East Superior Street, Chicago 11.

FOLDER ON FLUORIDATION AVAILABLE FOR LAY GROUPS

A new folder, "Why Your Dentist Recommends Fluoridation," has been published by the Council on Dental Health for distribution among nonprofessional groups and individuals. The booklets are available with or without the imprint of local or state society. Prices on quantity orders and other information may be obtained by writing to the Order Department, American Dental Association, 222 East Superior Street, Chicago 11.

Dental Societies

BROOKLYN SEMINAR TO GIVE VIEWS ON FOCAL INFECTION

A seminar on focal infection of dental origin will be presented on May 2 at the Brooklyn VA Hospital, sponsored by the Brooklyn Veterans Administration and the Second District of the Dental Society of the State of New York.

The views of the physician, bacteri-

ologist, oral surgeon and dental practitioner are to be presented. Lester R. Cahn, assistant professor, Columbia University, will summarize the viewpoints and will comment on the seminar. All members of the medical and dental professions have been invited to attend.

National Defense

ARMED FORCES TO INDUCT 175 DENTISTS DURING MAY

The Department of Defense has issued a call for 175 dentists to be inducted into the Armed Forces during May, in addition to the 335 scheduled for induction this month. In both calls, a dentist in Priority I may be drafted by the Selective Service System as a private under the "doctor draft law," unless he volunteers for a commission before his induction orders are received.

Meanwhile, the Army recently announced that it will order into active service 135 Reserve dentists who, Army spokesmen indicated, would have been drafted as Priority I registrants by Selective Service if they had not already joined the Reserve.

Of the 175 dentists most recently called for by the Department of Defense, 60 are to be assigned to the Army, 90 to the Navy and 25 to the Air Force. All draftees will be selected from Priority I registrants, who participated in federal training programs during World War II or who were deferred from service to attend dental school, and who have subsequently served less than 90 days in the federal military or public health service.

According to Selective Service figures, the latest calls will virtually exhaust the remaining pool of Priority I dentists.

International

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH MEETS

The International Association for Dental Research held its thirtieth general meeting, March 21-23 at the Broadmoor Hotel, Colorado Springs, Colo., with Leonard S. Fosdick of Chicago, presiding. The eight general scientific sessions featured the reading of 98 papers.

The dental materials group held four separate sessions, with Clyde Nelson of Milford, Del., chairman, presiding. Members of this group presented 21 papers on dental materials and two symposiums on self-curing denture base materials and on the evaluation of present casting procedures. Abstracts of all papers will be published in *The Journal of Dental Research.*

A further report on the meeting will appear in the May issue of THE JOURNAL.

PAN-AMERICAN UNIVERSITIES TO HOLD DENTAL CONGRESS

Representatives from North American and Latin American dental schools will discuss dental teaching, preventive dentistry and removable partial dentures at the First Dental Congress of Pan-American Universities, to be held May 4-10 in Buenos Aires, Argentina.

In the section on dental education, papers and discussions will cover teaching as a career, the dental curriculum, dental research and methods employed in teaching dentistry. The second and third sections will be covered by papers and symposiums on current methods in preventive dentistry and on the problems encountered in the use of removable partial dentures.

Dr. Guillermo A. Bizzozero, president of the Congress, has extended invitations

to 18 clinicians and teachers from the United States, as well as to outstanding authorities from Latin American countries.

Further information regarding the Congress may be obtained by writing to Stanley D. Tylman, 55 East Washington Street, Chicago.

CUBAN DENTISTS DISCUSS CHILDREN'S DENTAL HYGIENE

The first National Congress on School Hygiene, sponsored by the Cuban Ministry of Education, was held in Havana, February 8-10, with Ramon Iglesias, chief of dental hygiene, presiding. More than 300 delegates from six provinces attended.

Among the papers presented at the meeting was "Fluoride as a Preventive of Dental Caries," by Raul Maya of Havana, secretary for Central America of the Pan American Odontological Association.

BRITISH MISSION TO INSPECT RESULTS OF FLUORIDATION

The British mission to study fluoridation of public water supplies conferred with personnel at the American Dental Association's Central Office recently. The mission is led by H. H. Stones, editor of the *International Dental Journal,* dean of the Liverpool Dental School and director of the Liverpool Dental Hospital.

Other members of the mission are Miss J. R. Forrest, dental officer to the Ministry of Health; J. Longwell, scientific adviser to the Department of the Government Chemist; and Angus M. Thomson, research lecturer in the obstetrics department of Aberdeen University.

While in Chicago, the mission visited Evanston, Ill., where fluoridation has been in operation since 1947, and Aurora, Ill., where the optimum amount of fluoride is found naturally in the public water supply. In both communities, the teeth of young school children were examined.

Members of the British mission on fluoridation recently conferred with staff members of the Association. Shown at a conference are (l. to r.): Angus M. Thomson, research lecturer at Aberdeen University, Scotland; J. Roy Doty, secretary of the Council on Dental Therapeutics; J. Longwell, scientific adviser to the Department of the Government Chemist, Great Britain; Professor H. H. Stones, dean of the Liverpool Dental School, director of the Liverpool Dental Hospital and editor of the International Dental Journal; Louis M. Cruttenden, assistant secretary of the Association; Miss J. R. Forrest, dental officer to the Ministry of Health, Great Britain; Harold Hillenbrand, secretary of the Association, and Allen O. Gruebbel, secretary of the Council on Dental Health.

Leaders in government as well as dentistry attended the opening ceremonies of the seventh All India Dental Conference at Bombay in February. They included (l. to r., first row) S. P. Kapadia, president-elect of the All India Dental Association; the Hon. Rajkumari Amrit Kaur, Minister for Health of India; H. E. Raja Maharaj Singh, Governor of Bombay; H. D. Merchant, chairman of the reception committee; and M. K. Patel, president of the All India Dental Association.

The mission also traveled to various parts of the country to examine teeth of children, discuss the latest data on the results of fluoridation and to study the procedure in operation. On its return to London, the mission is to make recommendations to the Ministry of Health regarding the adoption of the fluoridation program.

FRENCH SOCIETY TO MEET IN SWITZERLAND MAY 22-25

The Congress of the Societé Française d'Orthopédie Dento-faciale will take place May 22-25 in Geneva, Switzerland. The principal topic will be "Normal Development of the Face." Further information may be obtained by writing to E. Fernex, Institut de Médecine Dentaire, Rue Micheli-du-Crest 43, Geneva, Switzerland.

NEW YORK DENTIST CONFERS ON DUTCH GUIANA DENTAL PLAN

Plans were laid for a national dental health program in Dutch Guiana recently during a two-week conference in Paramaribo between officials of the Surinam Dental Society and Harry Strusser, director of the bureau of dentistry, New York City Health Department.

Dr. Strusser visited Dutch Guiana at the request of the Society, which hopes to institute a dental health program to meet the needs of the 210,000 residents of Dutch Guiana.

While in Paramaribo, capital of the country, Dr. Strusser demonstrated modern methods in children's dentistry and visited bauxite mines to study the effects of the mineral on the teeth of the miners.

Dr. Strusser also visited Trinidad and Havana to consult with members of the Trinidad Department of Medical Services and to lecture on pedodontics before the Cuban Children's Dental Society, Havana.

ALL INDIA CONFERENCE HEARS APPEAL FOR DENTAL SCHOOLS

The need for more dental schools in India was stressed by spokesmen for the All India Dental Association at its recent annual conference in Bombay. M. K. Patel, president of the Association, and H. D. Merchant, chairman of the conference reception committee, in their opening addresses to the national meeting pointed out the acute shortage of dental teaching institutions.

The opening session was also addressed by H. E. Raja Maharaj Singh, Governor of Bombay. Present to extend greetings were the Hon. Rajkumari Amrit Kaur,

Minister for Health of India, and K. C. K. E. Raja, director general of health.

A symposium on periodontics, scientific papers and clinics and table demonstrations comprised the scientfic sessions. Chairside clinics and table demonstrations were repeated because of heavy attendance.

A feature of the general session was the distribution of prizes in the nationwide poster competition sponsored by the All India Dental Association. The Hon. Rajkumari Amrit Kaur presented the first place trophy to students of Lady Irwin School, New Delhi.

THEATER TELEVISION PLANNED FOR INTERNATIONAL CONGRESS

Clinics and demonstrations presented at the eleventh International Dental Congress in London July 19-26, will be televised on a 16 by 18 foot screen, according to the preliminary program of the Congress. The clinics will be viewed by dentists in the modern, 400-seat Telecinema theater adjoining the studios where clinicians will work. A continuous daily program of these demonstrations has been arranged, reports E. Wilfred Fish, chairman of the organizing committee of the Congress, which is sponsored by the Fédération Dentaire Internationale.

Further information on the Congress may be obtained by writing to Gerald H. Leatherman, Honorary Secretary, 35 Devonshire Place, London W. 1, England.

MEMBERS INVITED TO PRESENT PAPERS AT DUBLIN MEETING

Members of the American Dental Association who will visit Europe this summer and are interested in presenting a paper or clinic at a meeting of the Irish Dental Association in Dublin during the week of July 15 are requested to communicate at once with Harold Hillenbrand, secretary, American Dental Association, 222 East Superior Street, Chicago 11.

REPRESENTATIVE CHOSEN FOR CANADIAN MEETING

Bernerd C. Kingsbury of San Francisco has been appointed to represent the American Dental Association at the Golden Jubilee Meeting of the Canadian Dental Association, it was announced recently by LeRoy M. Ennis, president. The Canadian meeting will be held in Vancouver, British Columbia, June 15-18. Information on the program and on reservations may be obtained by writing to Don W. Gullett, 234 St. George Street, Toronto, Ont.

Dental Education

DENTAL EDUCATORS' MEETING HEARS ORAL SURGERY REPORT

Instruction in oral surgery was the subject of a seven-paper report presented at the twenty-ninth annual meeting of the American Association of Dental Schools, held March 23-26 in Colorado Springs, Colo.

The Committee on Instruction in Oral Surgery, which was appointed in 1950 by the Committee on Teaching, presented its report, consisting of seven papers on the development of the teaching of oral surgery, the need for oral surgery service, its current status, scope and objectives, suggestions for its clinical work and undergraduate and postgraduate instruction.

Ten conference sections on the teaching of specialized subjects were addressed by more than 80 essayists and panelists.

Ernest G. Sloman, dean of the College of Physicians and Surgeons Dental School, San Francisco, is retiring president of the organization.

A further report on the meeting will be published in the May issue of THE JOURNAL.

DRAFT DIRECTOR PRAISES ADVISERS ON STUDENT POLICY

Gerald D. Timmons, dean of the Temple University School of Dentistry, was among those commended recently by Maj. Gen. Lewis B. Hershey, for "invaluable service" in the formulation of the present Selective Service program on student draft deferments.

Dr. Timmons was a member of the original Advisory Committee on Specialized Personnel, which recommended the administration of college qualification tests to be used as a reference by local draft boards.

"The work of the committee has been of inestimable value to the nation," General Hershey, director of Selective Service said. The program has been in force one year and has administered college qualification tests to 358,637 students.

GRADUATE DENTAL FELLOWSHIPS OFFERED AT NORTHWESTERN

Several fellowships are available at Northwestern University for graduate study in pedodontics on a two-year program leading to the degree of Master of Science in Dentistry.

The fellowship combines graduate study, clinical experience and teaching, and a year of residency in Children's Memorial Hospital, Chicago. The first year is devoted to taking science and clinical courses and to working as an instructor in the pedodontics clinic or as a dentist in the Cleft Palate Institute. The second year may be spent in teaching or in residency at Children's Memorial Hospital.

Fellows receive free tuition and a stipend of $150 monthly. Residents in the hospital receive room and board and $60 monthly. Further information on this fellowship program, or similar ones in periodontics and oral surgery, may be obtained by writing to the Dean, Northwestern University Dental School, 311 East Chicago Avenue, Chicago 11.

HOSPITAL OFFERS INTERNSHIP IN GENERAL DENTISTRY

Internship training in general dentistry, rather than oral surgery, is now offered at the Waterbury Hospital of Waterbury, Conn. The change in internship training was approved by the Council on Dental Education recently, at the request of the hospital and upon recommendation of the Council's Committee on Internships and Residencies.

Application for the internship program may be made by writing to the director, Waterbury Hospital, Waterbury, Conn.

FIRST AID COURSE ADDED TO DENTAL CURRICULUM

A required course in first aid for all freshman dental students has been introduced at the University of Pittsburgh School of Dentistry. Now in effect for the freshman class of 96 students, the course is being taught by an authorized Red Cross teacher.

In one semester, the students will be expected to complete the preliminary, advanced and instructor's courses in first aid. A brief review course will be presented in the senior year.

Lawrence E. Van Kirk, dean of the school, pointed out that the course will serve a double purpose, providing a supply of first aid teachers for Civil Defense and equipping each dental graduate with training he may need as a dentist in a community emergency.

OHIO UNIVERSITY'S HEALTH CENTER SERVICES TELEVISED

Ohio State University's new $15,000,000 Health Center is being starred on a half-hour television program designed to show Ohioans the health services, care and facilities for teaching and research available at the Center.

The program, entitled "Picture of Health," is co-produced by television station WBNS-TV and the University. Films taken at the Health Center are supplemented on the program by narration and on-the-spot demonstrations. In various scenes dental and medical students, nurses and others play the parts of patients. The programs of the College of Dentistry, College of Medicine and School of Nursing will be highlighted during the series.

When the sixtieth anniversary of the School of Dentistry, Western Reserve University, is observed April 23, John S. Millis (left), president of the University will speak, and Peter J. Warren (right), president of the dental school's alumni association, will preside at the anniversary luncheon. They are shown here discussing the program of events which will mark the celebration in Cleveland.

SCHOOL OFFERS CONSULTATION ON ORAL AND FACIAL PAIN

The College of Dentistry, University of California, has inaugurated a "consultative oral and facial pain service," operating in connection with the school's section on oral diagnosis.

In his announcement of the service, R. Gordon Agnew, chairman of the section, termed the venture "a cooperative function of service and research." Participating in the consultations, in addition to the regular diagnostic staff, are an anatomist and oral surgeon, a neurologist, an internist, a specialist in the oral and dental applications of psychiatry and other staff members as required.

WESTERN RESERVE UNIVERSITY DENTAL ALUMNI PLAN REUNION

A reunion marking the sixtieth anniversary of the School of Dentistry, Western Reserve University, will be held April 23 at the Tudor Arms Hotel, Cleveland. Luncheon at 1 P.M. will follow a fellowship hour at noon. Guest speaker at the luncheon is to be John S. Millis, president of the University, who will discuss the evaluation functions of the dental school's advisory committee.

Alumni and their friends are invited to attend the reunion. Further information may be obtained from John T. Reifke, chairman of publicity, 912 Rose Building, Cleveland 15.

UNITED CEREBRAL PALSY SPONSORS DENTAL FELLOWSHIPS

Two fellowships have been established at Columbia University dental school to train dentists in the special medico-dental problems of treating children who are cerebral palsy patients.

The fellowships were established by the Dental Guidance Council for Cerebral Palsy and will be sponsored by United Cerebral Palsy of New York City, Inc. Each carries a stipend of $3,000 to $3,600.

The first year of the Cerebral Palsy Dental Fellowship program will consist

of clinic and classes in various fields of medicine as related to cerebral palsy; the second year will consist mainly of clinic work in pedodontics.

Application for a fellowship should be made by May 15 to Barnet M. Levy, director, postgraduate division, School of Dental and Oral Surgery, Columbia University, New York 32.

COMMISSION STUDIES NEED FOR AID TO DENTAL SCHOOLS

Representatives of the American Dental Association and the American Association of Dental Schools testified recently before the President's Commission on the Health Needs of the Nation. The Commission, under the chairmanship of Paul B. Magnuson, is currently investigating the question of federal aid to medical, dental and nursing schools.

Francis J. Garvey, secretary of the Association's Council on Legislation, told the Commission that the American Dental Association favors "in principle" federal aid to dental schools and students. However, Mr. Garvey termed "unrealistic" several aspects of S 337, a bill to provide grants for schools and scholarships for medical and dental students. He pointed out that the bill asumes that professional schools will accept additional students, whereas most schools are operating at capacity now.

J. Ben Robinson, dean of the University of Maryland Dental School, testified as chairman of the legislative committee of the American Association of Dental Schools. He stated that the schools also support the principle of aid to dental education; 37 of the 42 accredited dental schools, Dr. Robinson revealed, have indicated that they may have to seek federal aid in the future.

The President's Commission, which was created last December, will continue its fact-finding program; it must report its findings on the health needs of the nation by next December.

DENTAL SCHOOLS TO OFFER NEW POSTGRADUTE COURSES

Columbia • A full-time program in periodontology will be offered to graduate dentists at Columbia University this fall. The program, covering a period of two academic years, will correlate the fundamental sciences to clinic practice. Graduates will receive a certificate of training in periodontology.

Three postgraduate courses in periodontology are also scheduled at Columbia University dental school. The first will be offered full time from June 2 to June 13; the second will be presented one full day each week from September 24 to May 5, 1953; the third will be given one half day each week from September 24 to May 5, 1953.

Application for admission to these courses should be made by May 15. Further information may be obtained by writing to Barnet M. Levy, director, postgraduate division, School of Dental and Oral Surgery, Columbia University, New York 32.

Emory • Four continuation study courses for graduates in dentistry have been arranged by the Emory University School of Dentistry. Periodontology will be offered May 19-23, taught by James F. Allred, Ernest Banks, Grover Hunter, Jr., Aaron King, Olin Kirkland, E. D. McDonald, Gerald Mitchell and S. P. Vail. Fixed bridge prosthesis will be presented May 26-30, taught by R. A. McEwen and E. Neal Harris.

Dentistry for children, June 2-4, will be taught by Vincent Johnson, George Teuscher, Lamar Harrison, Willard Hunnicutt, Frank Lamons, L. B. Brown, Irwin Hyatt and Dowell Smith. Oral pathology and dental medicine will be offered June 5, with lectures by Col. Joseph L. Bernier and Harry Sicher, both guest lecturers. Preventive and restorative dentistry, June 6, will be taught by H. D. Jaynes, George Parry, Paul F.

Brown, Jr., Roy W. Adams and J. C. Wells.

Inquiries may be addressed to the office of the dean, Emory University School of Dentistry, 106 Forrest Avenue, N. E., Atlanta, Ga.

Georgetown • Four postgraduate courses will be offered by the School of Dentistry, Georgetown University, during April and May. Restorative procedure necessary in mouth rehabilitation will be taught by I. Franklin Miller and S. Charles Brecker, April 21-25. Three courses in advanced operative dentistry embracing airbrasive will be presented by John P. Burke, Maurice A. Goldberg, Charles B. Murto and Robert J. Furie, April 7-11, May 5-16 and May 19-23.

Further information may be obtained from C. V. Rault, dean of the School of Dentistry, Georgetown University, Washington 7, D.C.

Maryland • The Baltimore College of Dental Surgery will offer a series of five courses in the use of the airbrasive technic during the periods of June 16-21, June 23-28, July 7-12, July 14-19, and July 21-26.

Sessions will begin at 9 A.M. and continue until 5 P.M. daily, and will consist of lectures, demonstrations and clinical practice. Each course will be limited to 10 graduates of recognized dental schools; assignment to courses will be made in the order in which applications are received.

Further information and application blanks may be obtained by writing to William E. Hahn, director of graduate and postgraduate studies, 618 West Lombard Street, Baltimore 1.

New York • The department of pulp canal therapy of New York University, College of Dentistry, will present a postgraduate course beginning June 2. The 54-hour course will present a practical method of treating pulp-involved teeth, and will include lectures, demonstrations and clinical treatment of patients. Students may choose to attend classes on 18 consecutive mornings or on nine consecutive full days.

Further information may be obtained from Morris B. Auerbach, New York University, College of Dentistry, New York 10.

Temple • A course in clinical occlusion will be presented by Lewis Fox at the Temple University School of Dentistry, June 4-6. The course is designed to present the fundamentals of occlusion in relation to the physiology and pathology

Artist's sketch of the new dental building of the Medical College of Virginia, Richmond, as it will look when it is completed late this year. Ground breaking exercises were held last fall.

of the periodontal supporting tissues. Further information may be obtained from Louis Herman, director of postgraduate studies, Temple University School of Dentistry, Philadelphia 40.

OHIO STATE DENTAL SCHOOL'S ANNUAL ASSEMBLY PLANNED

The eighth annual post-college assembly of the Ohio State University dental school, to be held April 23-24 at Columbus, will be addressed by Joseph L. Morton, deputy director of civilian defense in Columbus, Ohio. Dr. Morton will speak on "The Dentist in Civilian Defense."

Essayists at the post-college assembly will include Lyle S. Pettit of Columbus, Col. Joseph L. Bernier of Washington, D. C., Lewis W. Thom of Minneapolis and S. Howard Payne of Buffalo, N. Y. Fifteen clinics will also be offered. Frank C. Starr of Columbus is general chairman of the assembly.

ARMY NAMES FOUR-MAN BOARD TO CHOOSE DENTAL INTERNS

Candidates for the Army Dental Internship Program have been selected from applicants by a four-man board of officers recently chosen by Maj. Gen. George E. Armstrong, Surgeon General of the Army.

The members of the board are: Brig. Gen. Neal A. Harper, DC, assistant chief of the Dental Division; Col. Charles M. Farber, DC, chief of the Dental Service Branch; Lt. Col. Douglas M. Beebe, DC, dental member of the Research and Development Board, and Maj. Louis H. Foubare, MSC, chief of the professional programs sections of the Personnel Division. All members are from the Surgeon General's Office.

Graduates of dental schools who are selected for internship will receive appointments as first lieutenants and must agree to serve a minimum of two years in active duty, including time spent in internship. The successful candidates will be announced later.

Public Health

INDUSTRIAL DENTISTS TO CONFER APRIL 22-24

The ninth annual meeting of the American Association of Industrial Dentists will be held during the 1952 Industrial Health Conference, April 19-26 at Cincinnati.

The industrial dentists will meet April 22-24 at the Netherland Plaza Hotel, Cincinnati. Among the features of their meeting will be a tour of a large industrial plant where a dental program is conducted. A discussion on the program will follow.

A panel discussion, "Dental Public Health and Industrial Dentistry," will also highlight the meeting. Bruce D. Forsyth, chief dental officer of the U. S. Public Health Service, will preside; participants will include W. Philip Phair, assistant secretary of the Association's Council on Dental Health; J. R. Robinson, director of dental public health, Jefferson County (Ky.) Health Department; and Edward R. Aston, dental consultant to the bureau of industrial hygiene, Pennsylvania Department of Health.

BILL PROPOSES GRANTS-IN-AID FROM TIDELANDS ROYALTIES

Legislation has been introduced into the House of Representatives, providing that royalties received from so-called "tidelands oil" be set aside by the federal Government for grants-in-aid of (1) education and research in health profes-

sions, such as medicine and dentistry, and (2) the construction and operation of hospitals and other community health facilities.

The bill was introduced recently by Rep. John F. Kennedy (D., Mass.). At the present time, 40 million dollars in royalties is being held in escrow while federal ownership of the tidelands is disputed by states bordering the lands.

ANTI-FLUORIDATION FORCES DEFEAT MEASURE IN SEATTLE

A proposal to fluoridate the water supply in Seattle was defeated in a referendum of the city's population, by a vote of 86,230 to 44,814. The fluoridation proposal was sponsored by the Seattle P.T.A. and was supported by the Seattle District Dental Society, the King County Medical Society and other health agencies.

Opponents of the fluoridation measure charged that fluorides would cause "cavities in head bones" and other undesirable effects, and that the city's physicians and dentists were promoting socialized medicine.

(For comments on the referendum, see page 457.)

NEW YORK DENTAL BUREAU SPONSORS COURSE ON TUMORS

A course on tumors of the oral cavity, sponsored by the bureau of dentistry, New York City Department of Health, was attended recently by 16 dentists. The course was taught by Rieva Rosh, assistant clinical professor of radiology at New York University-Bellevue Medical Center. Dr. Rosh presented one lecture and three clinics, at which he exhibited slides of various types of oral tumors and demonstrated the use of radium and roentgenology in treating these tumors.

General

WINNER OF ESSAY CONTEST ON ATOMIC ENERGY NAMED

The First District Dental Society of New York has awarded a prize of $100 to Bernard M. Kilbourne for submitting the best essay on "Atomic Energy and Its Relation to Dentistry." Dr. Kilbourne was a senior at New York University dental school when he wrote his paper last year; he is now a lieutenant in the armed services

In view of the great interest shown, the First District Dental Society will conduct a similar competition this year, for the best essay on "The Value of Radioactive Isotopes in Dental Research." A $100 award will be made to the senior dental student in the United States or Canada who submits the best essay by December 1, 1952.

NEW JERSEY EXAMINATIONS IN DENTISTRY SCHEDULED

The New Jersey State Board of Registration and Examination in Dentistry will administer clinical examinations for dentistry on June 2 and 3 at the University of Pennsylvania, and on June 12 and 13 at New York University. Written examinations will be given June 4-6 in Trenton.

Examinations in dental hygiene will be administered June 2 and 3 at the University of Pennsylvania.

Preliminary application, together with a fee of $50 for dental or $20 for dental hygiene candidates, must be filed by April 15.

Beginning in June, the New Jersey dentistry examinations will consist of four sections: clinical prosthetic dentistry; clinical operative dentistry; oral diagnosis

and treatment planning; written examinations. A candidate may take one examination in each section. If he fails to pass, he may take, within a period of three years, two reexaminations in the sections failed. Sections in which the candidate is satisfactory need not be repeated; failure to pass any part of a section will require reexamination in the whole section.

GERALD G. BURNS, FORMER ASSOCIATION OFFICER, DIES

Gerald G. Burns of Rochester, N. Y., life member and former vice-president of the American Dental Association, died on February 16 at the age of 78. He was a past president of the New York State Dental Society and had practiced in Rochester from 1895, when he was graduated from the University of Buffalo dental school, until 1951. A veteran of overseas service during World War I, Dr. Burns until recently had held a commission as Lieutenant Colonel in the Army Reserve.

COLORADO DENTAL FOUNDATION ANNOUNCES SIXTH SEMINAR

Recent developments in anesthesia, endocrinology and nutrition will be presented at the sixth annual seminar of the Colorado Dental Foundation to be held June 15-19 in Colorado Springs. Essayists are to be Harry Sicher of Chicago, Hugo Rony of Chicago, Samuel Dreizen of Birmingham, Ala., and Max Sadove of Chicago. Scientific sessions will be held at the Fine Arts Center in Colorado Springs.

ENDODONTISTS ASSOCIATION ANNOUNCES 1952 OFFICERS

F. D. Ostrander of Ann Arbor, Mich., was installed as president of the American Association of Endodontists at its recent annual meeting in Chicago. Other officers elected to serve in 1952 are L. A. Lucas of Oklahoma City, Okla., president-elect; N. Weir Burkman of Birmingham, Mich., vice-president; Vincent B. Milas of Chicago, secretary; Thomas C. Starshak of Chicago, treasurer, and Victor H. Dietz of St. Louis, editor.

SIGMA EPSILON DELTA INSTALLS NEW OFFICERS

When the Sigma Epsilon Delta dental fraternity held its first Grand Council meeting of 1952 recently, Alexander L. Ungar of New York was installed as grand master, succeeding Irving Abramson of Baltimore. Other officers for 1952 are S. Leonard Rosenthal of Philadelphia, grand chaplain; Jerome A. Boley of Brooklyn, grand scribe; Murray S. Mahler of New York, treasurer; Max Matzkin of Waterbury, Conn., grand inner guard; Daniel Schwartz of Paterson, N. J., grand outer guard, and Samuel Friedman of Baltimore, historian.

MEXICAN ORTHODONTISTS ELECT OFFICERS FOR 1952-53

The Mexican Association of Orthodontics (Asociacion Mexicana de Ortodoncia) recently announced its newly-elected officers for 1952-53. They are: Rutilio S. Blanco, president; Roberto M. Ruff, secretary, and Margarita Correa, treasurer.

Book Reviews

INVESTMENTS FOR PROFESSIONAL PEOPLE

By Robert U. Cooper. 310 pages. Bibliography and index. Price $4. New York, Macmillan Co.

This book covers a wider range of topics than its title indicates. In addition to discussing the different types of investments, Dr. Cooper deals with two subjects which will help the practitioner to obtain funds to invest: (1) the program known in dentistry as "practice management," and (2) important considerations in paying federal income tax. The primary importance of accumulating investment funds is obvious. As Dr. Cooper points out, "A justly famous recipe for rabbit potpie begins with the sage admonition, 'First catch the rabbit.'"

However, five-sixths of the book is devoted to problems of investment. The section on insurance explains the differences among the several types of policies and gives helpful tips on selecting an insurance company. The section on real estate gives information which is useful in buying a home, as well as in purchasing income-producing property. Banks are discussed not only from the standpoint of investments but also from the standpoint of services which banks may offer. The chapters on stocks and bonds are preceded by an explanation of how to analyze financial statements of corporations.

The section on common stocks is especially thorough. The author makes the presentation in full consideration of the fact that professional men have a limited amount of time to devote to the study of the market. He discusses sources of information on the stock market, and compares the relative merits of different formulas for purchase and sale of stocks. A conservative approach is recommended to the professional man who invests in securities.

Other topics covered include investment funds, special investment opportunities, disposal of estates and development of the investment program.

This book should pay for itself many times over for the dentist who has funds to invest and who is interested in providing for emergencies and for retirement.

B. Duane Moen

THE PHYSIOLOGICAL FOUNDATION OF DENTAL PRACTICE

By L. L. Langley and E. Cheraskin. 511 pages with 149 illustrations. Index. Price $8.25. St. Louis, C. V. Mosby Co., 1951.

The philosophy behind the preparation of this book should be of interest to both the dental school teacher and the dental practitioner. It recognizes that a student learns facts and principles more rapidly when he can see the relationship between courses containing basic information and the clinic and laboratory activities relating directly to his future profession.

With this philosophy as a guide, Langley and Cheraskin have sought to aid both students and instructors by providing a dental textbook with many practical applications of principles formerly discussed in an abstract way in some textbooks.

This text of more than 500 pages is small in comparison to the majority of texts now used in dental schools. Admittedly, it is not a complete and comprehensive treatment of the subject of physiology. Rather, it is an over-view of physiology, with greater attention given to those concepts and principles which are important to the dental student and the dental practitioner.

Examples and illustrations are dominated by those referring specifically to dental applications and to the anatomy and physiology of the head and neck. The book has sections devoted to the following topics: (1) the nervous system, (2) circulation, (3) respiration, (4) excretion, (5) alimentation, and (6) endocrinology. The first two sections comprise more than 60 per cent of the text, an evidence of the fact that much greater attention is given to those principles of physiology which are of particular concern to the dentist.

It would seem that this book would be most useful for regular assignments, with more voluminous and more detailed texts being used for reference. As a text, it should provide a stimulus to teachers, encouraging them to develop additional examples and illustrations. The practicing dentist and physician should find this book useful as an instrument for hastily reviewing basic principles of physiology.

Shailer Peterson

Current Literature

TREATMENT OF MALUNION FRACTURES OF FACIAL BONES

Reed O. Dingman and Robert L. Harding. Plast. & Reconst. Surg. 7:505, June, 1951.

As a general principle, it might be stated that acute fractures of the facial bones are not a surgical emergency. Asphyxia, hemorrhage, and shock are the most common emergency problems associated with facial injuries and prompt attention must be directed toward correction of these conditions. It is desirable to institute definitive treatment as soon as possible after the injury but not before the general condition of the patient warrants. Deaths sometimes occur when overenthusiastic surgeons add surgical trauma to an already embarrassed patient.

Early attention should be given to the repair of soft tissue injuries. In some cases it is expedient to carry out open reduction of the fractures at the time of the primary or the delayed repair. With adequate antibiotic administration the results are uniformly good provided the wound is reasonably clean. Such a plan seems best suited to fractures involving the zygomaticomaxillary compound, the nasal bones and the mandible when compounded extraorally.

Following injury to the facial bones, there is often prompt distortion due to emphysema, edema and interstitial hemorrhage which obscures the underlying structural deformity. After the acute phase subsides and the resultant deformity becomes evident, it may be too late to utilize any of the ordinary methods of reduction.

Methods for the management of deformities due to malunion of fractures of the bones of the face are discussed. Fractures of this type should have early and adequate treatment.

Frontal bone deformities are corrected with cancellous bone as the material of choice. The deflected nose is corrected by nasal osteotomy and iliac bone is recommended for the saddle nose. The graft is held in place by direct wiring.

Malunion of the zygomaticomaxillary compound can be managed by osteotomy and realignment of the fragments. A new procedure referred to as the impression tray method of refracture is described for use in cases of fibrous malunion of the maxilla. Multiple osteotomies followed by supportive grafts is suggested as a means of correcting the so-called "dish-face" deformity.

Warren R. Schram

CHANGES IN BONE AND CEMENTUM IN PERIODONTAL DISEASES

Joseph L. Bernier. J. Periodont. 22:29, January, 1951.

The nature of the influence of inflammation on the calcified tissues of the periodontium is discussed. Histological analysis of over 7,000 clinically normal gingival specimens shows the presence of early inflammatory changes in a high percentage. Studies have indicated that bone and cementum are closely allied so that the reaction of one to infection and inflammation can be made to include both in many instances.

Many biochemical theories of calcification have been advanced. Regardless of which is correct, it can be seen that inflammation, with its alterations in pH, CO_2 levels, alkaline reserve, and protein and carbohydrate metabolism, might easily affect the process of calcification.

The cellular exudate in gingivitis demonstrates an increasing number of plasma cells (derivatives of lymphocytes) which may indicate an important role in controlling and destroying invading organisms. Consequently it may be that in periodontitis, the inflammation process is initiated and sustained by extraordinary factors (associated with function as related to mastication) which requires the full mobilization of these cells (lymphocytes and plasma cells). Simultaneous proliferation toward repair and retrogressive changes toward necrosis in the periodontal membrane should be considered as being disturbances in cell chemistry rather than alterations in cell potential because in inflammation, cell potential is not in conflict with the factors responsible for either benign or malignant neoplasia. So-called hypertrophic and hyperplastic gingival changes associated with gingivitis need not be given special consideration since the basic reactions remain unchanged. The gingival changes are different in pregnancy because of specificity in etiology and difference in tissue changes. The so-called "fibromatosis gingivae" is considered a benign neoplasm because failure of the usual clinical treatments indicate an aberration in cellular growth qualities.

Histologic changes are also noted. The role of the osteoclast is emphasized by the resorption of the alveolar crest which represents an extension of the inflammatory process. Dilation of the blood vessels and fibrosis of the marrow substance precede the loss of tone and disintegration of fibers of the periodontal membrane. Apical extension brings further modification in function and environment. Bifurcation involvement is just the extension of this inflammatory process and should not be considered a separate entity.

Alveolar bone growth is continuous throughout life with deposition of bone being accentuated near the apex and on the distal side. Cementum is also deposited continuously, especially near the apex, which compensates for the loss of coronal tooth structure. Cementum and bone may both be influenced by inflammation to hyperactivity or repression upon which is superimposed the constant alteration in masticatory function.

Such studies emphasize the complexity of periodontal disease by demonstrating the many factors involved. Advances in microscopy and histochemical analysis may add new knowledge to the histopathology of periodontal disease. The mechanism of calcification and the role of the plasma cell in inflammation especially need further study.

William A. Peterson

THE ETIOLOGY OF THE PERVERTED SWALLOWING HABIT

Walter J. Straub. Am. J. Orthodont. 37: 603, August, 1951.

This article presents a survey of papers which have appeared about tongue habits, and the cause of abnormal swallowing habits.

Normal deglutition involves the following steps: The teeth are closed in centric position. The tip of the tongue is depressed and then the tongue moves back in the mouth, its tip just posterior to the rugae. Upward and posterior tongue pressure is exerted as the nasopharynx is closed by the soft palate. Then the larynx moves up and the epiglottis covers the opening.

A series of 237 patients with perverted swallowing habits were studied. In normal deglutition, the muscles of expression do not change. When the swallowing habit is perverted, the jaws are not brought together by the masticatory muscles. Rather, the tongue is inserted forward and between the teeth, creating an open bite. The facial muscles of expression contract and are strained. All the patients studied were bottle fed babies. In bottle feeding, to avoid a prolonged procedure, several large holes often are put into the nipple. The child, instead of sucking the milk from the bottle, is forced to prevent itself from choking from excess milk by placing its tongue forward with the nipple between it and the upper gum pad and lip. The perverted swallowing thus has its origin during infancy because of the improper bottle feeding.

Morton Heide

THE DEVELOPMENT OF THE EDGEWISE ARCH MECHANISM AND ITS PLACE IN CONTEMPORARY ORTHODONTICS

G. H. Terwilliger. Am. J. Orthodont. 37: 670, September, 1951.

A study of the background of orthodontic appliances reveals that the trend during the latter part of the nineteenth century consisted largely of a search for an efficient means of attachment to teeth; the multiplicity of appliances of that day afforded, to varying and limited degrees, the means for aligning crowns, chiefly by tipping movements. Moving teeth bodily was shown to be desirable by the more difficult cases of malocclusion, but the ingenuity manifest in the earliest attempts in this direction was often exceeded by inherent impracticality. Without attempting to say definitely who first developed a method for the bodily movement of teeth, it may be safely said that in the pin and tube appliance of Edward H. Angle, reasonable simplicity met adequate control for the first time.

After observing the results of treatment with the ribbon arch over a number of years, Angle sought to improve appliance mechanics still further by increasing the number of teeth under precise control by creating the edgewise wing bracket originally to be used in conjunction with the ribbon arch appliance. He soon became aware of the mechanical possibilities of these brackets, and he discarded the ribbon arch principle and inaugurated the use of this bracket, for entire assemblage. "The latest and the best," as Angle called the edgewise arch, provided a bracket slot which was entered from the buccal surface instead of the incisal, and made possible the control by brackets of all teeth which could be banded.

William F. Ford

Deaths

Austin, William Garnett, Chattanooga, Tenn.; Atlanta-Southern Dental College, 1936; died December 19; aged 40.

Bagley, Loren A., Red Bluff, Calif.; College of Dentistry, University of California, 1909; died January 8.

Baker, Norman H., Charleston, W. Va.; Dental Department, Baltimore Medical College, 1909; died October 29; aged 65.

Barton, Earle S., Houlton, Maine; Dental School, Tufts College, 1915; died December 19; aged 60.

Bedford, Charles W., New York; New York Dental School, 1898; died January 21; aged 80.

Berry, Henry W., Chicago; Dental School, Northwestern University, 1919; died January 26; aged 55.

Biehler, Henry C., St. Louis; St. Louis Dental College, 1906; died December 14; aged 82.

Binger, Albert M., Troy, Pa.; School of Dentistry, University of Pittsburgh, 1911; died December 11.

Bixby, Winfield L., Rutland, Vt.; Ohio College of Dental Surgery, University of Cincinnati, 1907; died December 25; aged 79.

Blondin, Arthur A., Manchester, N. H.; Baltimore College of Dental Surgery, 1912; died January 7; aged 66.

Bond, Francis E., Binghamton, N. Y.; Philadelphia Dental College, 1901; died December 11; aged 73.

Brantley, W. Morel, Birmingham, Ala.; Birmingham Dental College, 1908; died December 22; aged 61.

Breining, Lowell B., Warrensville, Ohio; Baltimore College of Dental Surgery; 1901; died March 19, 1951.

Brosnan, John J., Wallingford, Conn.; School of Dentistry, University of Pennsylvania, 1906; died November 9; aged 67.

Burke, John J., Jefferson Barracks, Mo.; School of Dentistry, University of Pennsylvania, 1888; died December 21; aged 91.

Caldwell, Ben B., Union, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1922; died December 8; aged 53.

Case, Charles M., Chicago; Dental School, Northwestern University, 1906; died February 7; aged 79.

Cheney, Charles A., Fond du Lac, Wis.; Dental School, Northestern University, 1895; died February 9; aged 81.

Conklin, Wilber R., Sterling, Colo.; Dental School, Northwestern University, 1906; died December 5; aged 67.

Conover, Peter H., Harrodsburg, Ky.; Louisville College of Dentistry of Centre College, 1910; died November 8; aged 68.

Corbin, William E., Brownwood, Texas; State Dental College, Dallas, 1917; died December 10; aged 63.

Coughlin, Edward T. A., Richland, Mich.; College of Dental Surgery, University of Michigan, 1949; died November 12; aged 30.

Crawford, Oscar B., Pottsville, Pa.; School of Dentistry, Temple University, 1892; died December 24; aged 83.

Cutler, William A., Council Bluffs, Iowa; College of Dentistry, University of Iowa, 1913; died December 27; aged 66.

Davis, William P., Laurel, Miss.; Baltimore College of Dental Surgery, 1874; died May 26; aged 80.

Deutschman, Vernon T., Chicago; College of Dentistry, University of Illinois, 1940; died February 7; aged 36.

Dolby, George H., New York; Dental School, Northwestern University, 1910; died January 15.

Donahoe, John D., Sioux Falls, S. D.; Chicago College of Dental Surgery, Loyola University, 1902; died November 2; aged 72.

Eickholt, John L., Toledo, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1919; died December 15; aged 57.

Elliott, Earle E., Rochester, N. Y.; School of Dentistry, University of Pennsylvania, 1903; died November 30; aged 75.

Ferrell, Margaret, Camilla, Ga.; Atlanta-Southern Dental College, 1919; died January 16.

Ferren, Omer S., Toledo, Ohio; School of Dentistry, University of Pittsburgh, 1909; died December 22; aged 71.

Fuller, Charles G., Buffalo; School of Dentistry, University of Buffalo, 1919; died December 17; aged 63.

Gilman, Harry F., Meredith, N. H.; Dental School, Tufts College, 1913; died August 17; aged 59.

Good, George A., Chicopee, Mass.; School of Dentistry, University of Louisville, 1919; died December 28; aged 66.

Graham, Oliver J., Milford, Mich.; School of Dentistry, University of Denver, 1902; died December 17.

Greif, Benjamin L., Brooklyn; College of Dentistry, New York University, 1905; died October 6.

Groebner, Alfred F., New Ulm, Minn.; School of Dentistry, University of Pennsylvania, 1915; died December 7; aged 59.

Grove, Newell M., Wyoming, Ohio; Cincinnati College of Dental Surgery, 1897; died November 14; aged 76.

Harper, William C., Chandlerville, Ill.; Dental School, Northwestern University, 1914; died November 29; aged 67.

Hess, Paul L., Clarksburg, W. Va.; Cincinnati College of Dental Surgery, 1924; died June 29; aged 51.

Hood, Sidney T., Chicago; College of Dentistry, University of Illinois; 1914; died February 16.

Huhner, John S., New Orleans; New Orleans College of Dentistry, 1907; died November 27; aged 65.

Inglis, Lester, Atlantic Highlands, N. J.; College of Dentistry, New York University, 1908; died December 23.

Jacobs, William T., Muskogee, Okla.; died October 21; aged 76.

Jani, George M., Washington, D. C.; School of Dentistry, Georgetown University, 1930; died December 23.

Johnson, Alvin F., St. Paul; College of Dentistry, University of Minnesota, 1921; died December 21; aged 65.

Johnson, Solomon E., Ocean Springs, Miss.; Dental Department, Meharry Medical College, Nashville, 1923; died April 3, 1951.

Kent, Charles W., Dallas, Texas; Chicago College of Dental Surgery, Loyola University, 1910; died September 11.

Kiernan, Thomas J., Bronx, N. Y.; College of Dentistry, New York University, 1922; died August 30.

Knapp, Albert A., Jersey City; College of Dentistry, New York University, 1919; died January 18; aged 56.

Knapp, Victor H., Evansville, Ind.; Ohio College of Dental Surgery, University of Cincinnati, 1901; died December 16.

Knox, John W., Camp Lejeune, N. C.; Dental School, Northwestern University, 1947; died January 1; aged 31.

Labby, Harry A., Portland, Ore.; School of Dentistry, North Pacific College of Oregon, 1914; died March 27, 1951; aged 60.

Land, William H., Pasadena, Calif.; Chicago College of Dental Surgery, Loyola University, 1900; died December 4; aged 75.

Levien, Leon I., New York; New York College of Dentistry, 1897; died June 23; aged 78.

Loughney, John J., Kearney, N. J.; Department of Dentistry, Medico-Chirurgical College of Philadelphia, 1916; died November 28.

Sondergaard, Einar P., Austin, Minn.; College of Dentistry, Creighton University, 1926; died December 18; aged 53.

Spickard, Raymond S., Miami, Fla.; Ohio College of Dental Surgery, University of Cincinnati, 1913; died January 4; aged 60.

Sproul, Bert C., Chicora, Pa.; School of Dentistry, University of Pittsburgh, 1918; died December 12.

Stallings, Edward A., Terrell, Texas; Baltimore College of Dental Surgery, University of Maryland, 1896; died August 8.

Stewart, Moses E., Clinton, Ill.; Dental School, Northwestern University, 1903; died November 3; aged 73.

Sunderland, Jett H., Jerseyville, Ill.; School of Dentistry, Washington University, St. Louis, 1907; died November 22; aged 67.

Trostel, Henry E., York, Pa.; Dental School, University of Pennsylvania, 1900; died May 31; aged 76.

Vance, Donald M., Huron, S. D.; College of Dentistry, Creighton University, 1926; died December 23; aged 57.

Weaver, Clarence K., Clay Center, Kan.; Dental School, Northwestern University, 1905; died January 20; aged 71.

Weinrib, Samuel, New York; College of Dentistry, New York University, 1913; died July 30; aged 62.

Wesner, Charles M., Chicago; Chicago College of Dental Surgery, Loyola University, 1894; died November 15; aged 86.

Whittier, Stanley S., Fairhope, Ala.; College of Dentistry, University of Illinois, 1929; died February 7; aged 52.

Whittle, Clarence P., Weymouth, Mass.; Dental School, Tufts College, 1892; died December 17; aged 86.

Wilkins, Frank R., Forest City, N. C.; Louisville College of Dentistry of Centre College, 1916; died December 19.

Williams, Russell F., New Wilmington, Pa.; School of Dentistry, University of Pittsburgh, 1932; died December 24; aged 44.

Williamson, Burt C., Montgomery, Ala.; Atlanta-Southern Dental College, 1907; died December 28; aged 71.

Wilson, James F., Indianapolis; Baltimore College of Dental Surgery, 1897; died November 30.

Wineburgh, Samuel, Chicago; Dental School, Northwestern University, 1918; died February 13; aged 55.

Yngve, Samuel, Minneapolis; College of Dentistry, University of Minnesota, 1915; died December 8; aged 64.

York, Guy E., Walla Walla, Wash.; School of Dentistry, North Pacific College of Oregon, 1913; died November 28; aged 70.

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222 East Superior Street, Chicago 11, Illinois
WHitehall 4-6730

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Third Annual Session	Sept. 8-11, 1952	St. Louis
Ninety-Fourth Annual Session	Sept. 28-Oct. 1, 1953	Cleveland
Ninety-Fifth Annual Session	Nov. 8-11, 1954	Miami

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 14, 15	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Alaska	July 14-17	Anchorage	R. A. Smithson	Box 1293, Anchorage
Arizona	Apr. 24-26	Phoenix	E. M. Scott	17 E. Welden Ave., Phoenix
Arkansas	Apr. 6-9	Little Rock	D. M. Hamm	White Bldg., Clarksville
California	Apr. 21-23	San Francisco	L. R. Ludwigsen	450 Sutter St., San Francisco
S. California	May 5-7	Los Angeles	C. A. Moss	1401 S. Hope St., Los Angeles
Colorado	Oct. 5-8	Colorado Springs	R. A. Downs	1422 Grant St., Denver
Connecticut	May 21-23	Bridgeport	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 14, 1953	Wilmington	J. J. Ficca	2130 Lancaster Ave., Wilmington
District of Columbia			K. H. Wood	202-1835 Eye St., N. W. Washington
Florida	Apr. 20-23	Jacksonville	T. A. Price	808 Congress Bldg., Miami
Georgia	Nov.	Savannah	J. M. Heard, Jr.	803 Persons Bldg., Macon
Hawaii	June 11-14	Honolulu	J. H. Dawe	810 N. Vineyard St., Honolulu 17
Idaho	June 30-July 2	Sun Valley	F. E. Carpenter	123 Main Ave., W., Twin Falls
Illinois	May 19-22	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 12-14	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 5-7	Des Moines	H. I. Wilson	639 Insurance Exchange Bldg., Des Moines
Kansas	May 11-14	Topeka	F. A. Richmond	861 Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 2	Louisville	A. B. Coxwell	1976 Douglas Blvd., Louisville
Louisiana	Apr. 17-19	Shreveport	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June	Rockland	S. Gower	Skowhegan
Maryland	May 4-7	Baltimore	E. L. Pessagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 4-7	Boston	H. E. Tingley	12 Bay State Road, Boston
Michigan	Apr. 21-23	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Feb. 23-25, 1953	Minneapolis	C. V. E. Cassel	242 Lowry Medical Arts Bldg., St. Paul
Mississippi	June 9-12	Biloxi	H. M. Campbell	102 Professional Bldg., Tupelo
Missouri			R. R. Rhoades	201 Merchants Bank Bldg., Jefferson City
Montana	May 8-10	Butte	C. S. Renouard	304 Phoenix Bldg., Butte
Nebraska	May 12-14	Omaha	F. A. Pierson	1112 Federal Securities Bldg., Lincoln
Nevada	June	Reno	R. La Fond	Medical Dental Bldg., Reno
New Hampshire	June 29-July 1	Bretton Woods	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23, 24	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	Apr. 14-16	Roswell	J. S. Eilar	Suite 7, Medical Arts Square, Albuquerque
New York	May 12-15	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 11-14	Pinehurst	B. N. Walker	Liberty Life Bldg., Charlotte
North Dakota	May 15-17	Minot	J. H. Lunday	302 Black Bldg., Fargo
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 20-23	Oklahoma City	R. C. Calkin	109½ W. Oklahoma, Guthrie
Oregon			H. C. Fixott, Jr.	308 Selling Bldg., Portland
Panama Canal Zone	Dec. 9		F. D. Buckley	Box 293, Rodman
Pennsylvania	May 5-7	Reading	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Jan. 1953		A. Guiñones	San German
Rhode Island			E. L. Bessette	1745 Broad St., Cranston 5
South Carolina		Greenville	J. R. Owings	7 Medical Court, Greenvill

State	Date	Place	Secretary	Address
South Dakota	May 18-20	Mitchell	E. W. Elmen	Sioux Falls
Tennessee	May 5-7	Memphis	W. L. McCulley	Brown Bldg., Cleveland
Texas	Apr. 28-May 1	Fort Worth	W. Ogle	3607 Gaston Ave., Medical Bldg., Dallas
Utah	June 11-14	Zion National Park	E. O. Thompson	915 Medical Arts Bldg., Salt Lake City
Vermont	May	Woodstock	W. J. Reardon	Rutland
Virginia	Apr. 28-30	Virginia Beach	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	May 15-17	Seattle	C. R. Flood	230 Medical-Dental Bldg., Seattle
West Virginia	July 14-16	White Sulphur Springs	A. B. Drake	508 West Virginia Bldg., Huntington 1
Wisconsin	Apr. 14-17	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming		Casper	T. J. Drew	State Capitol Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

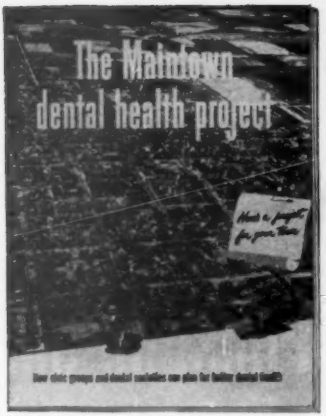
State	Date	Place	Secretary	Address
Alabama	June 16	Birmingham	M. D. Edwards	132 Adams Ave., Montgomery
Alaska	July 7-11	Anchorage	J. H. Geyer	P. O. Box 915, Juneau
Arizona	Aug. 11-16	Florence	R. K. Trueblood	25 N. Second Ave., Glendale
Arkansas	June 23-26		H. O. Weatherly	205 Halter Bldg., Conway
California			K. I. Nesbitt	507 Polk St., San Francisco 2
Colorado	June 23-27	Denver	C. K. Phillips	724 Republic Bldg., Denver 2
Connecticut	June 16-21*	Bridgeport	C. G. Brooks	302 State St., New London
Delaware	June 16-18*	Wilmington	P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. M. Falls	1801 Eye St., N. W., Washington 6
Florida	July 7-12*	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			S. H. Yarbrough	Medical Arts Bldg., Columbus
Hawaii			H. L. Houvener	427 Dillingham Bldg., Honolulu
Idaho	June 23	Boise	W. K. Adams	718 Arthur St., Caldwell
Illinois			W. A. McKee	503 Wood Bldg., Benton
Indiana	June 17-20*	Indianapolis	C. A. Frech	504 Broadway, Gary
Iowa	May 19-23	Iowa City	H. M. Willits	719 Roshek Bldg., Dubuque
Kansas	June 2-5	Kansas City, Mo.	G. L. Teall	Box 71, Hiawatha
Kentucky	June 2-5	Louisville	R. I. Todd	Western Union Bldg., Richmond
Louisiana			A. R. deNux	Marksville
Maine	June 16-19	Boston	R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 9-11	Baltimore	H. Levin	3429 Park Heights Ave., Baltimore 15
Massachusetts	June 23, 24, 26, 27‡ June 25-27‡‡	Boston	J. C. Wilson	State House, Boston 33
Michigan	June 8-14	Ann Arbor	J. L. Champagne	3714 W. McNichols Road, Detroit 21
Minnesota			F. A. Larson	1632 Washington St. N. E. Minneapolis
Mississippi	June 17-19*	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
Missouri	June 9, 10, 13, 14 June 11-14	St. Louis Kansas City	R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			V. J. Quinn	Box 865, Helena
Nebraska	June 3-7	Lincoln	H. E. Weber	1210 Federal Securities Bldg., Lincoln
Nevada			G. C. Steinmiller	Masonic Temple, Reno
New Hampshire	June 20, 21		D. J. Freese	4 Wall St., Concord
New Jersey	June 2, 3**‡‡ June 4-6§ June 12, 13**	Philadelphia Trenton New York	W. A. Wilson	150 E. State St., Trenton 8
New Mexico	June 23-26	Santa Fe	J. J. Clarke, Sr.	Artesia
New York			D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	July 7-11	Fargo	A. B. Crabtree	Ellendale
Ohio	June 23-27	Columbus	H. B. Smith	322 E. State St., Columbus
Oklahoma			J. B. Cole, Jr.	706 Asp, Norman
Oregon	June 9-12*		F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	June 19-21* June 21†† June 23-25†	Philadelphia Philadelphia and Pittsburgh	R. E. V. Miller	Northampton National Bank Bldg., Easton
Puerto Rico		Santurce	L. C. Coll	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina	June 26-28		T. C. Sparks	1315 Pickens St., Columbia
South Dakota	June 22-25		K. A. Stormo	Lead
Tennessee	June 9-13	Memphis	F. S. Maxey	804 Bennie Dillon Bldg., Nashville 3
Texas	June 15-21‡ Apr. 26, 27‡‡	Dallas	R. T. Weber	312 Capital National Bank Bldg., Austin
Utah	June 23-27	Salt Lake City	F. E. Lees	324 State Capitol Bldg., Salt Lake City

State	Date	Place	Secretary	Address
Vermont	June 23-25	Montpelier	F. A. Reid	Windsor
Virginia			J. M. Hughes	715 Medical Arts Bldg., Richmond 19
Washington	June 16-20		J. B. Kiefer, Jr.	510 Cobb Bldg., Seattle
West Virginia	June 23-25	West Liberty	C. A. Laughlin	613 Prunty Bldg., Clarksburg
Wisconsin	June 16-20*	Milwaukee	S. F. Donovan	Tomah
Wyoming	June 23-25	Casper	W. A. Hocker	212 O & S Bldg., Casper

*Dentistry and dental hygiene.
**Dental clinical examinations.
†Dental and dental hygiene written examinations.
§Dental written examinations.
††Dental hygiene clinical examinations.
‡Dental examinations.
‡‡Hygienists' examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
American Academy of Dental Medicine	May 29-31	Montreal, Canada	W. M. Greenhut Secy.	124 E. 84th St., New York 28
American Association of Dental Examiners	Sept. 5, 6	St. Louis	C. A. Bumstead Secy.	924 Stuart Bldg., Lincoln, Neb.
American Association of Industrial Dentists	Apr. 22-24	Cincinnati	E. R. Aston Secy.	1400 N. Cameron St., Harrisburg, Pa.
American Association of Orthodontists	Apr. 21-24	St. Louis	G. R. Moore Secy.	919 Oakland Ave., Ann Arbor, Mich.
American Board of Dental Public Health	Sept.	St. Louis	P. E. Blackerby, Jr. Secy.	250 Champion St., Battle Creek, Mich.
American Board of Orthodontics	Apr. 16-20	St. Louis	C. E. Martinek Secy.	661 Fisher Bldg., Detroit 2
American Board of Pedodontics	Aug. 4-7	San Francisco	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln, Neb.
American Dental Assistants Association	Sept. 8-11	St. Louis	M. L. Martin Exec. Secy.	410 First National Bank Bldg., La Porte, Ind.
American Dental Society of Europe	July 15-18	London, England	F. D. Derrick Secy.	140 Park Lane, London W. 1, England
American Denture Society	Sept. 5, 6	St. Louis	A. L. Roberts Secy.	Aurora National Bank Bldg., Aurora, Ill.
American Public Health Association	Oct. 20-24	Cleveland	R. M. Atwater Exec. Secy.	1790 Broadway, New York 19
American Society of Oral Surgeons	Oct. 8-11	New Orleans	R. F. Whalen Exec. Secy.	1112 E. Clay St., Richmond, Va.
Canadian Dental Association and British Columbia Dental Association, Golden Jubilee	June 15-18	Vancouver, B. C., Canada	C. M. Whitworth Secy.	Joint Convention Committee, Canadian Dental Association, 218 Medical-Dental Bldg., Vancouver, B. C., Canada
Eleventh International Dental Congress	July 19-26	London, England	G. H. Leatherman Hon. Secy.	35 Devonshire Place, London W. 1, England
Iowa Conference in Oral Surgery	Mar. 31, Apr. 1	Iowa City	J. G. Whinery Chm.	State University of Iowa Hospitals, Iowa City
National Board of Dental Examiners	Apr. 7, 8 Dec. 1, 2		S. Peterson Secy.	222 E. Superior St., Chicago 11
New Orleans Dental Conference	Nov. 9-12	New Orleans	M. R. Matta Secy.	629 Maison Blanche Bldg., New Orleans
Northwest Conference in Dental Medicine	Apr. 13-17	Hood River, Ore.	P. L. Meacham Secy.	426 Medical Arts Bldg., Portland, Ore.
Odontological Society of Western Pennsylvania	Nov. 11-13	Pittsburgh	W. E. Craig Secy.	206 Jenkins Bldg., Pittsburgh 22
Southeastern Society of Oral Surgeons	Apr. 11, 12	Hollywood, Fla.	G. W. Matthews Editor	1922 Tenth Ave., S., Birmingham, Ala.
Southern Society of Orthodontists	Aug. 10-13	Asheville, N. C.	F. P. Bowyer Secy.	608 Medical Arts Bldg., Knoxville, Tenn.



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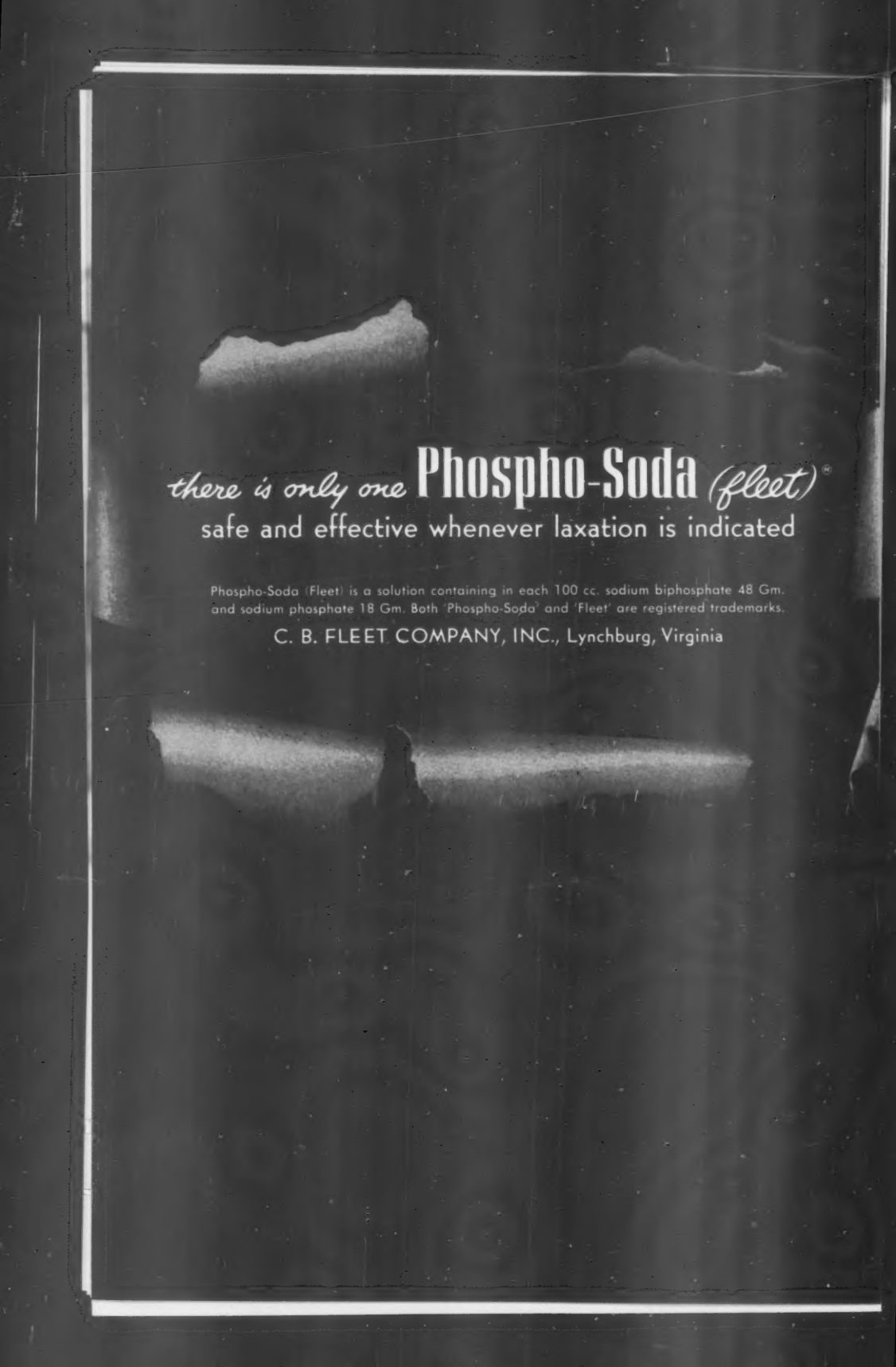
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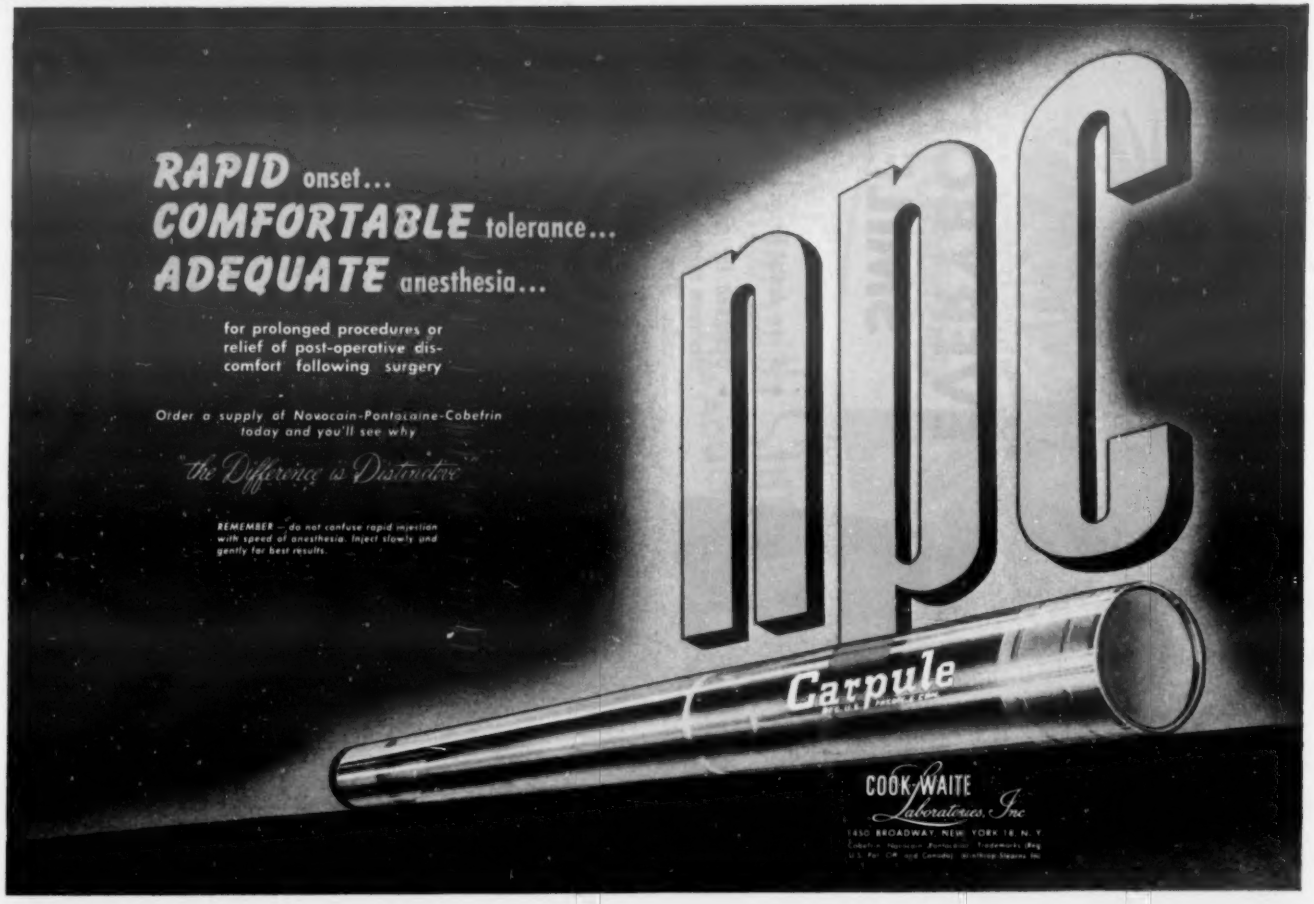
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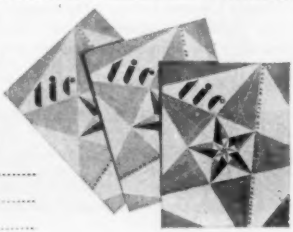

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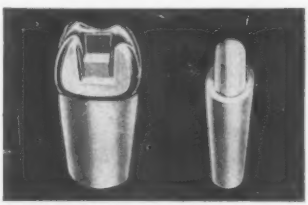

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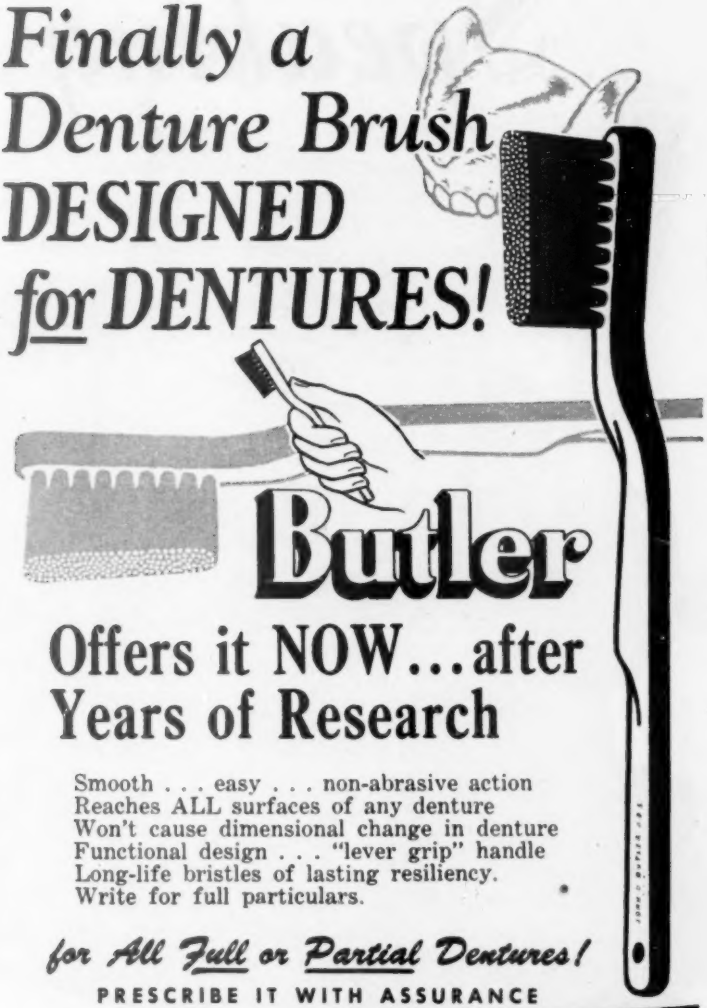

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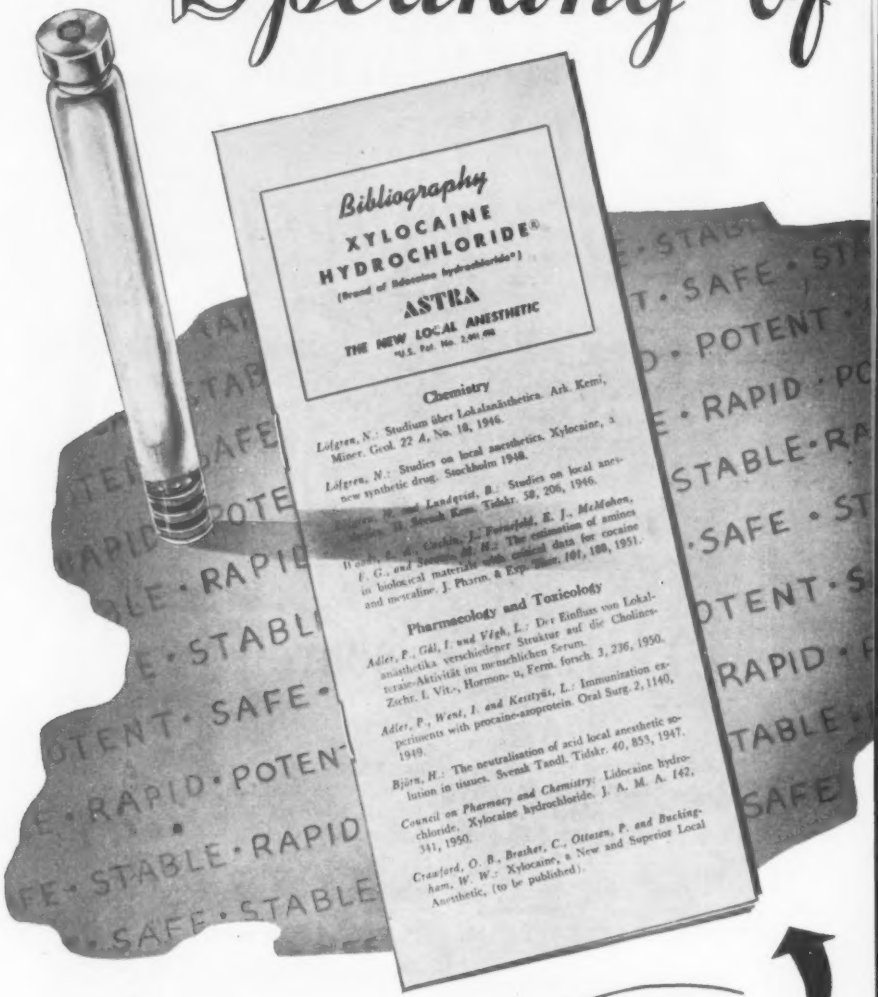
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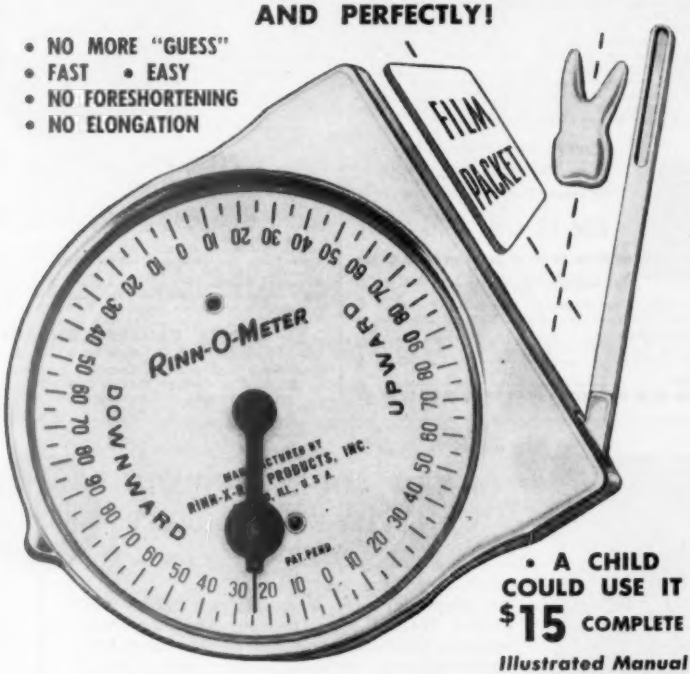

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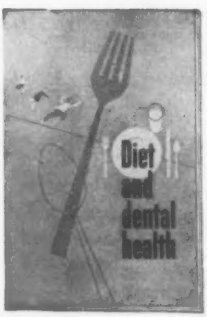

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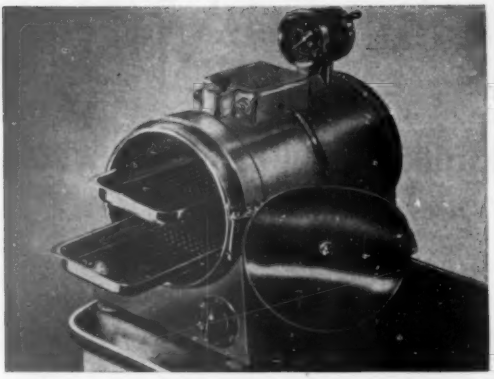

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1. Smith, J. M. Calcium needs of teen-age boys. Nutrition News, (April), 1947.

2. Kramer, M. N., Potter, M. T., and Gillum, I. Utilization by normal adult subjects of the calcium and phosphorus in raw milk and in ice cream. J. Nutrition *4*:105 (May) 1931.

3. Dahlberg, A. C. and Loosli, J. K. Nutritive value of commercial ice cream. J. Am. Diet. Assn. *24*:20 (Jan.) 1948.

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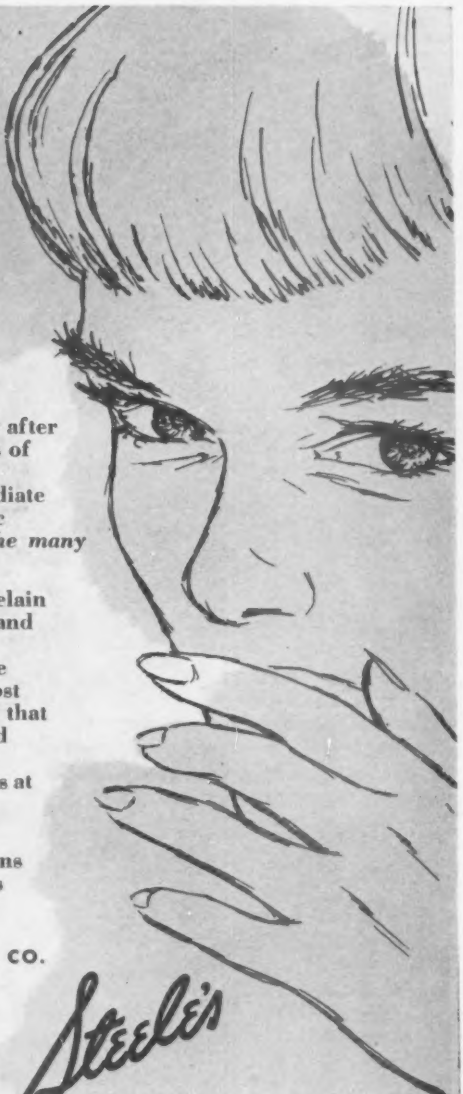

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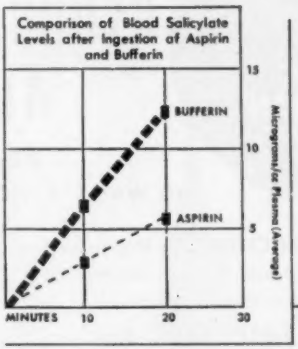

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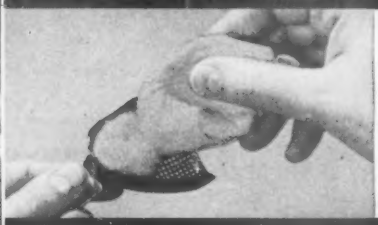

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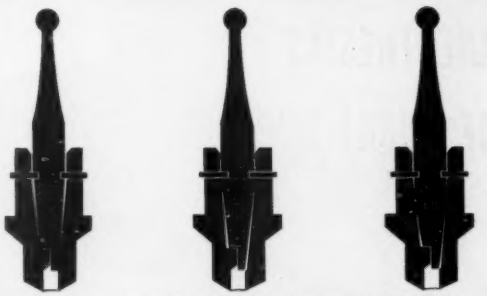

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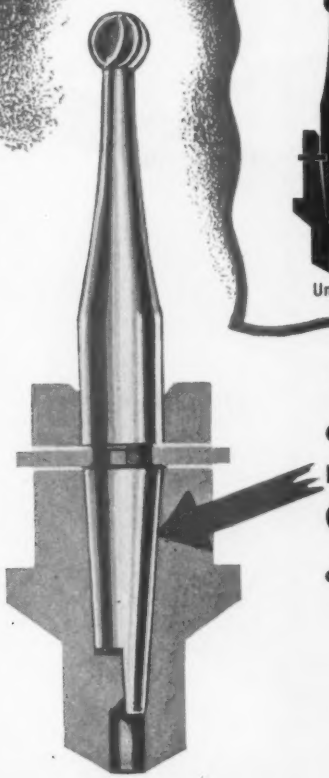

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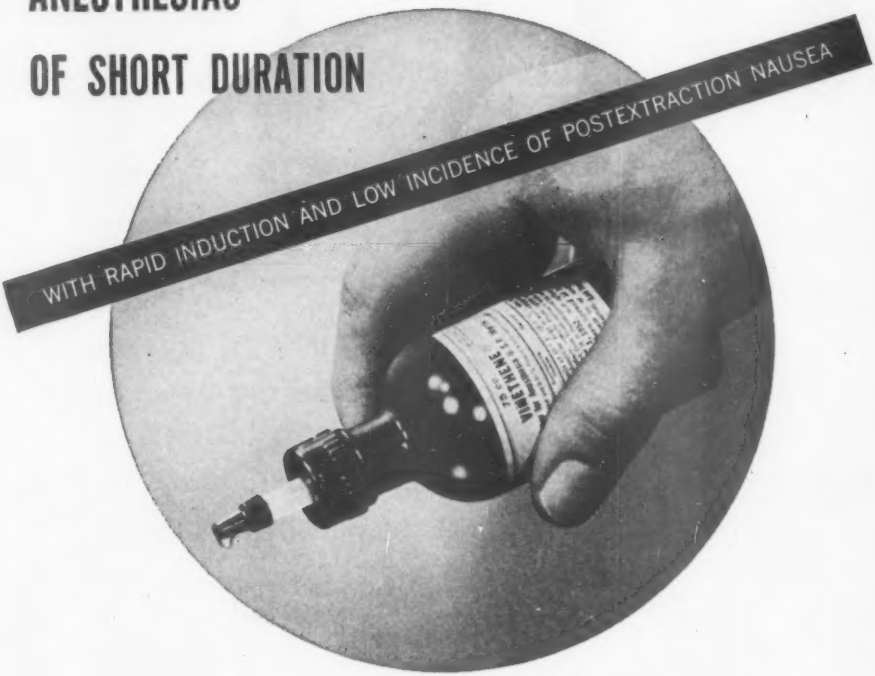

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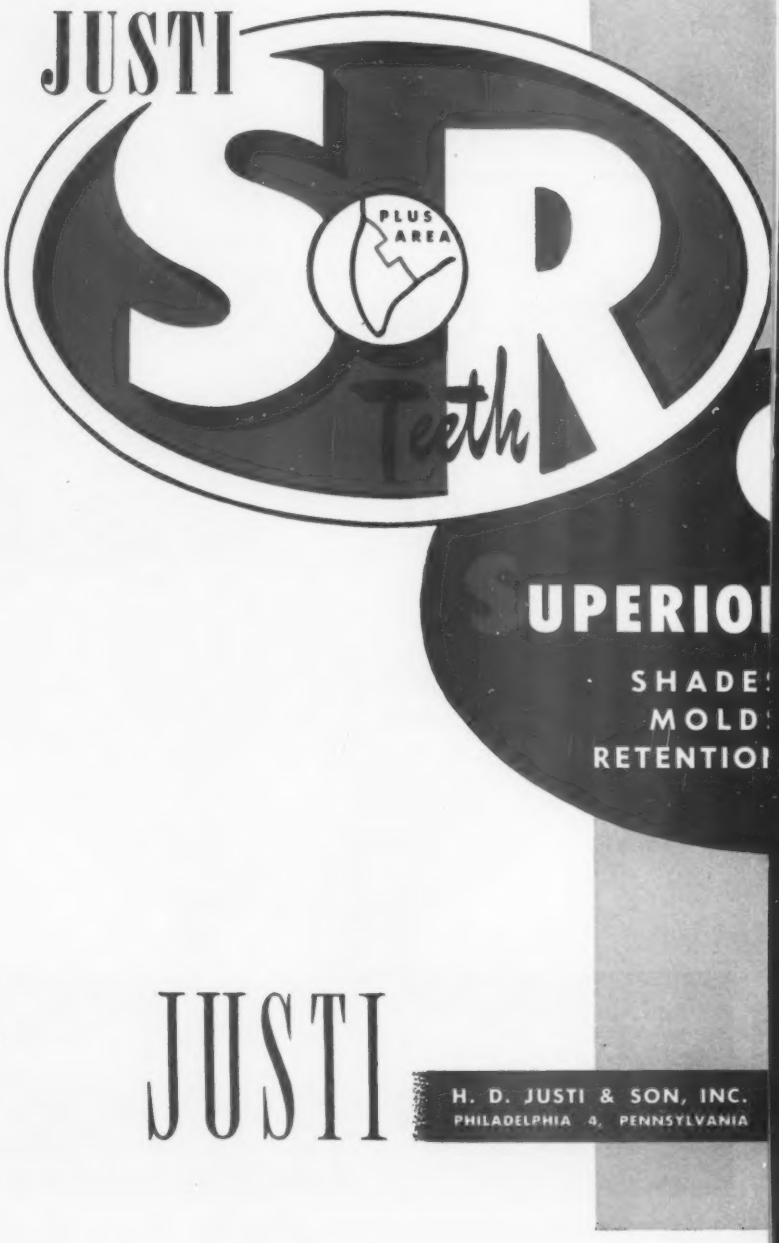
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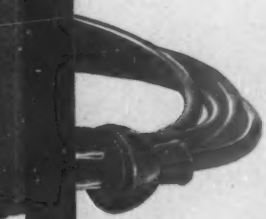

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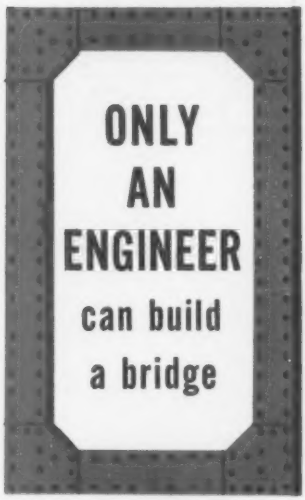

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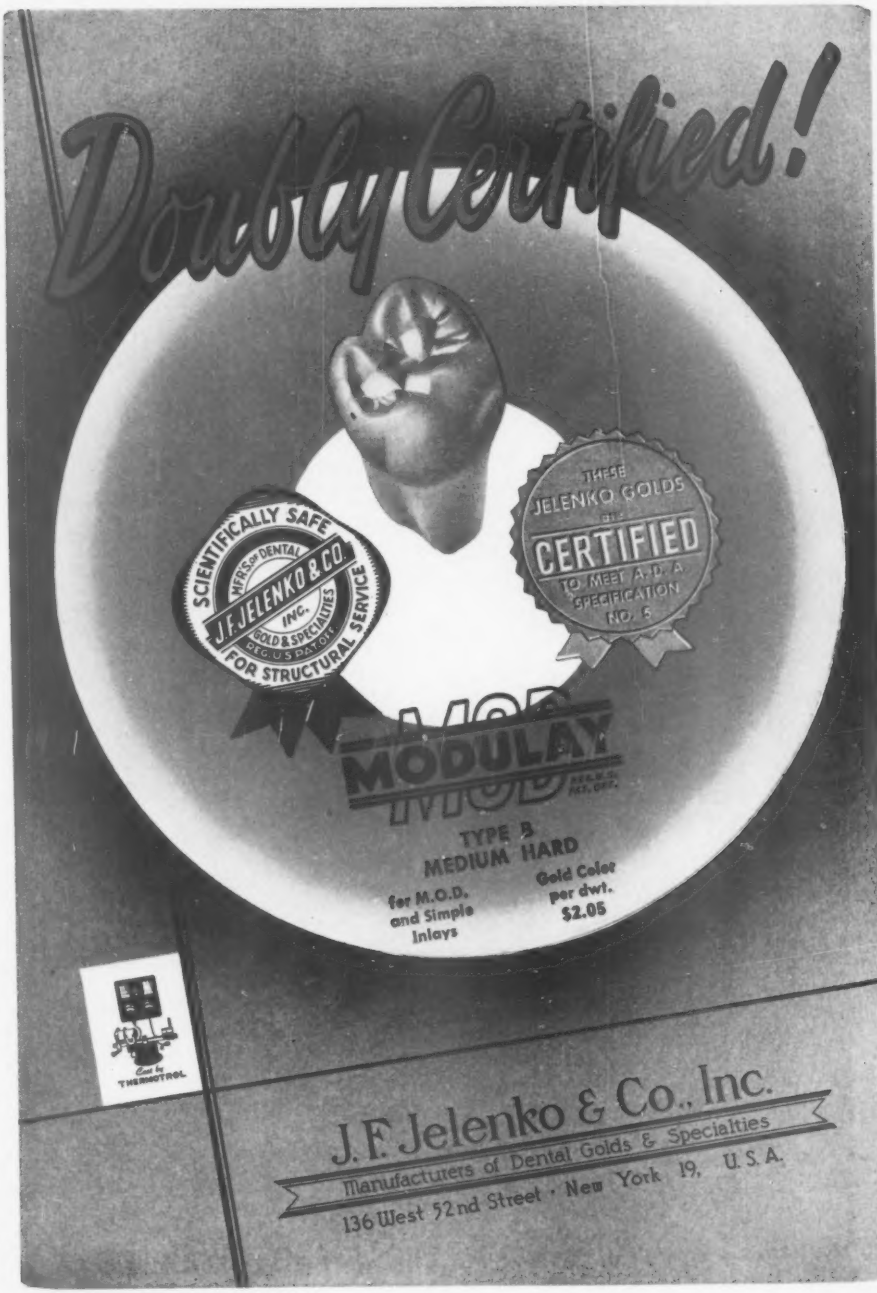
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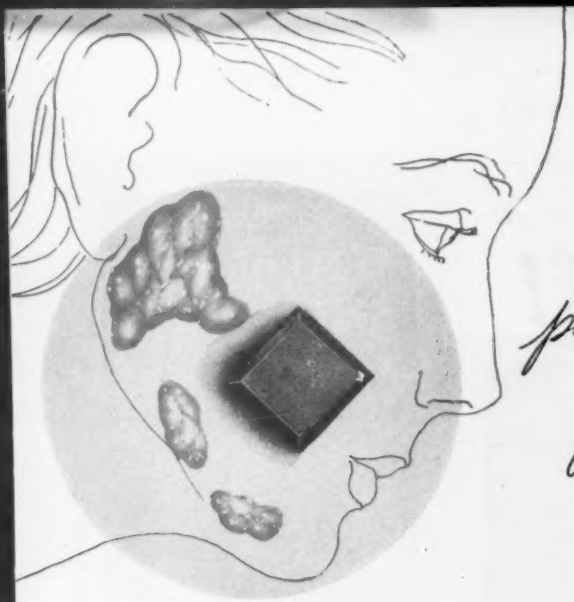
Manufacturers of Dental Golds & Specialties
136 West 52nd Street · New York 19, U.S.A.



palatable chewing gum base assures.....

prolonged release of penicillin in the mouth

ORYGENE®

Penicillin Chewing Troches, Parke-Davis

ORYGENE's peppermint flavored, chicle gum base encourages retention of the troche in the mouth, thereby assuring high salivary penicillin levels throughout the recommended half-hour chewing period. Both texture and taste of ORYGENE promote mastication, thus stimulating the salivary glands and dispersing penicillin-laden saliva throughout the oral cavity. This bathing of affected tissues in steadily maintained concentrations of penicillin produces prompt clinical results in most patients with oropharyngeal infections caused by penicillin-sensitive organisms.

ORYGENE Penicillin Chewing Troches are accepted by children and adults as readily as are familiar confections they so closely resemble.

Dosage and Method of Use. One ORYGENE troche should be chewed at a time, preferably for 30 minutes. In treating infections caused by Vincent's organisms, a daily total of 4 to 6 troches will usually produce clinical results within 24 to 48 hours, although precautionary treatment should be continued for several days thereafter. It may be necessary to supplement ORYGENE by parenteral administration of penicillin, or by other measures as indicated.

Packaging. Each ORYGENE troche containing penicillin G, crystalline potassium salt, 20,000 units, is wrapped individually and hermetically sealed in metal foil — no refrigeration necessary. Available on prescription in packages of 12.

MEDICAMENTA VERA · PD Co.

Parke, Davis + Company

See for yourself!

How Denicotea filters cigarettes!

THE EVIDENCE IS CRYSTAL CLEAR

BEFORE USE: *The Denicotea Crystal Filter is pure white*

AFTER USE: *Denicotea filter turns black as it absorbs nicotine and tars.*

One look at a used Denicotea filter is more convincing than a thousand words.

You can actually *see* the frightening amount of irritants it removes from cigarette smoke.

Obviously, that tarry stuff is better in the filter than in nose, throat—*and lungs.*

It stands to reason that cigarettes—*any cigarette*—are less irritating when filtered the Denicotea way.

What's more, you'll notice the difference in the whiteness of your patients' teeth and the condition of their gums.

PROFESSIONAL ⅓ PRICE INTRODUCTORY OFFER:

Send for your Denicotea Holder, **$1.25** postpaid (regularly $2.50)
Longer, Lady Denicotea Holder, **$1.75** postpaid (regularly $3.50)
Write to
Alfred Dunhill, Dept. D-4 660 Fifth Ave., New York 19

dunhill DE·NICOTEA *FILTER* HOLDER

THE
MEDICAL
PROTECTIVE
COMPANY
FORT WAYNE,
INDIANA

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PROFESSIONAL PROTECTION
EXCLUSIVELY
SINCE 1899

specialized service
assures *"know-how"*

"Super Absorbent" COTTON ROLLS

These improved cotton rolls are a delight to the efficient dentist and are not harsh to the patient's mouth. They are actually spun from 100% pure surgical absorbent cotton to make them softer, more pliant and noncollapsible. They adapt easily into any position, are stretchable and small tufts are quickly detachable.

DENTAL ABSORBENTS CO.
619 East Montecito St.
Santa Barbara, Calif.

FREE SAMPLE
Use Coupon

Gentlemen:
Please send me a free, generous sample of DENTAL ABSORBENTS.

DR._____

STREET_____

CITY and STATE_____

KADON

brings you every advantage

for the "brush on" technic

1. IRREGULAR PARTICLE STRUCTURE,
a unique characteristic of Kadon powder, is ideally suited to "Brush On" application. With so much of the surface of each particle exposed, wetting is instantaneous. Deep penetration of liquid produces a truly homogeneous filling.

2. HIGHER HEAT OF POLYMERIZATION
causes faster setting in the cavity as the filling is built up in successive layers.

3. The new KADON APPLICATION KIT
Here, for the first time, are instruments of truly professional character for "brushing on" resin restorations. The tapering shanks of the aluminum handles are slotted for easy and secure attachment in the ferrules of the individual brushes.

$4.75

Flint glass dispensing tray
Six detachable brushes
Two aluminum handles

WHATEVER YOUR PREFERENCE IN TECHNIC . . . NON-PRESSURE, CONVENTIONAL, OR INLAY . . .

THE RESTORATIVE RESIN OF CHOICE IS

Kadon brings you the widest range of life-like colors for quick, efficient tooth matching.

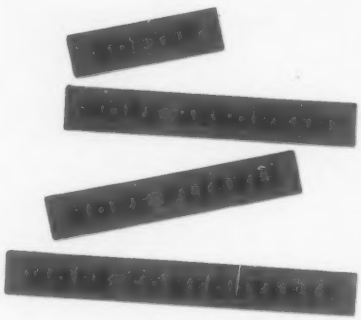
Caulk KADON

REG. U.S. PAT. OFF.

Lengthwise fibers of pure, *uncoated* cotton held securely in shape by thin strands of fine, soft thread, sealed at every crossing

RICHMOND
DENTAL COTTON ROLLS

This completely new type of all-cotton roll brings you advantages no other roll can offer:



The natural softness and pliability of pure absorbent cotton, free of any stiff coating material. Greater absorbency, because the all-cotton surface comes in immediate contact with the saliva. Complete protection against seepage, since these rolls fit the buccal curvature snugly and comfortably, without forming stiff, harsh wrinkles. Freedom from chemical or mechanical irritation during use and upon removal . . . Richmond Rolls never stick to the oral mucosa or pull off bits of tissue.

•

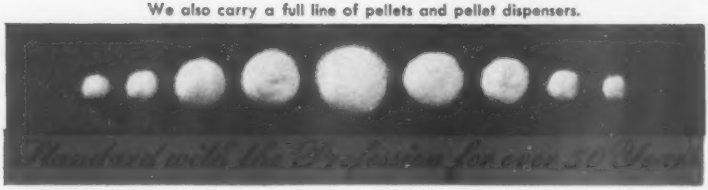
SUPPLIED in three sizes, Large, Medium and Small, in 6 inch and 1½ inch lengths.
Sterilized after packaging.

Write for a generous testing sample.

RICHMOND DENTAL MFG. COMPANY

Box 2176, Charlotte 1, N. C.

We also carry a full line of pellets and pellet dispensers.



5082

For permanent rebasing

AT THE CHAIR

Only DuraBase can do a DuraBase job!

DuraBase

DuraBase is now firmly established as the successful method of rebasing acrylic dentures at the chair—proved by more than a million cases. Patients are thrilled with the permanent comfort, stability and complete suction.

Order the $10 DuraBase package, pink or clear—sufficient for 20 applications. If you are not completely satisfied after several cases, the remainder may be returned for full credit.

Takes Only 20 Minutes

No Laboratory Procedure

Simple One-Visit Technique

Easy as Taking an Impression

Hard, Durable, Non-Expensive

No Unpleasant Aftertaste

Lasts as Long as Dentures

Precise, Stable, Comfortable

Your Satisfaction Guaranteed

Reliance

DENTAL MFG. CO.

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CHICAGO 5, ILLINOIS

when a
MILD
sedative
is indicated

CONSIDER these advantages of the new, improved NEMBUTAL Elixir: clear, sparkling color, pleasant odor and much better taste than the old Elixir. Action is prompt, duration is easily controlled by varying the dosage, and there is seldom any "hangover."

PLEASANT CHANGE. The new NEMBUTAL Elixir offers a pleasant change of medication for patients who require sedation to quiet their nerves, to relieve apprehension, to bring them to your chair in a cooperative mood. Even children can take it straight without difficulty.

SMALL-DOSAGE CONVENIENCE. Potency of the new Elixir is the same as that of the old. One teaspoonful (1 fl.-dr.) represents 15 mg. (¼ gr.) of short-acting NEMBUTAL Sodium, making it easy to administer small doses for mild effect. The new Elixir is available through your usual source of supply in 1-pint shelf-saving and 1-gallon bottles. Try it in your next few cases; note for yourself its effectiveness.

Abbott

Try the new, better tasting

Nembutal® Elixir

(PENTOBARBITAL, ABBOTT)

you get

absolute accuracy

every time

with

D-P

elastic

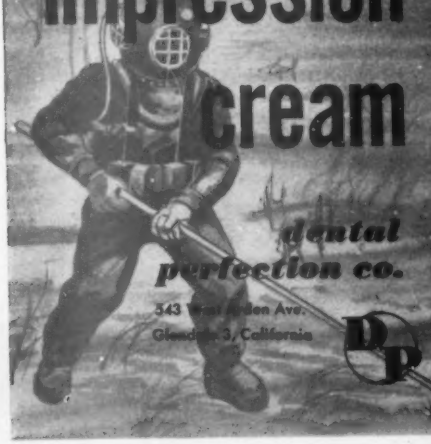
impression

cream

D-P Elastic Impression Cream has had a CONSISTENT FORMULATION for years—made possible by *exclusive D-P marine laboratory research*—the all-important step that enables D-P, and ONLY D-P, to control the *entire* manufacturing process of its impression materials all the way from the basic ingredient (algae) to the finished product.

Consistent formulation is your guarantee that the package of D-P Elastic Impression Cream you use today will give you exactly the same results as the package you used last month or last year.

Order from your Dental Dealer NOW!



dental perfection co.

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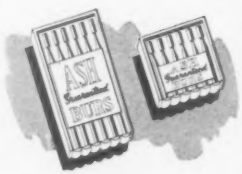
D-P

Ash BURS...

For over 130 years dentists the world over have enjoyed the fine performance of Ash Products. Today, they recognize Ash Burs as the sharpest, smoothest-running and most durable Burs on the market.

And the reason for this high degree of professional acceptance lies in the way Ash Burs are made. Manufactured in the largest, most scientifically operated bur plant in the world, Ash Burs are made from the finest grade of tungsten steel — and by the most skilled craftsmen available.



Ash Burs are made in a wide variety of sizes — Regular, Miniature and Tapered Shank. Protected in a handy, plastic pack, Ash Burs always arrive in perfect condition.

Order a supply of famous Ash Burs from your dealer today. Your skill deserves the finest!

Claudius Ash, Sons & Co., U.S.A., Inc.

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THE NAME "ASH" HAS IDENTIFIED FINE DENTAL PRODUCTS FOR OVER 130 YEARS.

DEPTH WITHOUT DANGER

In an anesthetic *Safety* is the *First* consideration

Use Formula

2ME

Accepted Council on Dental Therapeutics American Dental Association

MONOCAINE 2% *with* Epinephrine 1:50,000

In Submarines "Depth without Danger" is of prime importance . . .

In local anesthesia too we must consider the relationship between safety and depth. A number of anesthetic drugs in excessive concentrations or combinations will produce deep anesthesia. So will cocaine. But all of these *"stronger"* anesthetics can induce toxic reaction and, in many instances, unpleasant postoperative sequellae.

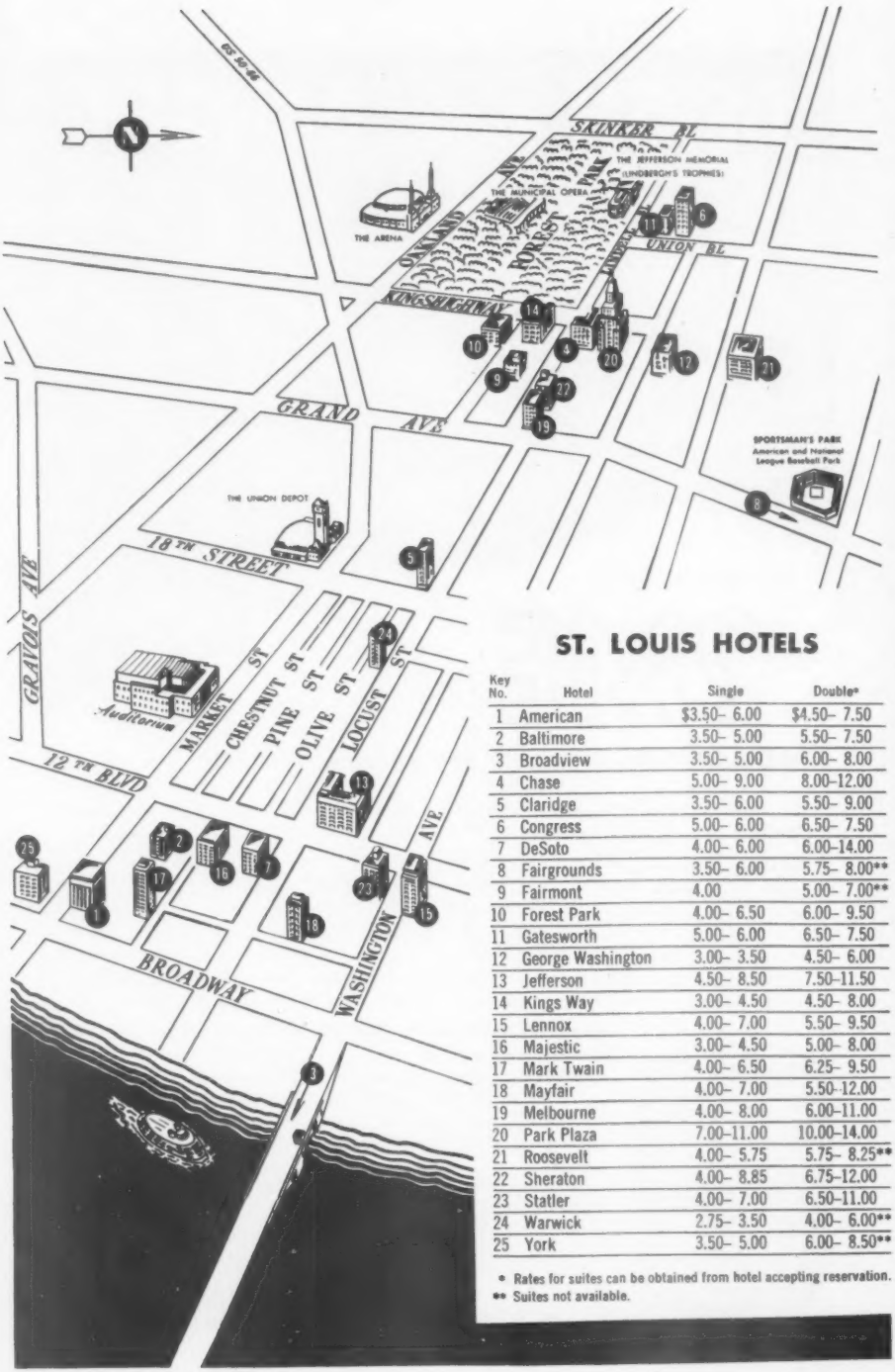
Monocaine Formula 2ME (Monocaine 2% with epinephrine 1:50,000), on the other hand, produces anesthesia as deep as procaine 4%, yet its toxicity is appreciably less than that concentration of procaine.

Monocaine Formula 2ME was specifically developed for those cases in which anesthesia is difficult to obtain. While Monocaine 1½% is recommended for routine use, Monocaine Formula 2ME will be found to be particularly advantageous for jacket crown work, pulp extirpation and the preparation of bridge abutments.

MONOCAINE Formula 2ME *offers the anesthetist depth without danger—it combines adequate potency with maximum safety.*

Monocaine is the registered trade mark of the Novocol Chemical Mfg. Co., Inc.

NOVOCOL CHEMICAL MFG. CO., INC.
2911-23 Atlantic Ave. Brooklyn 7, N. Y.



ST. LOUIS HOTELS

Key No.	Hotel	Single	Double*
1	American	$3.50– 6.00	$4.50– 7.50
2	Baltimore	3.50– 5.00	5.50– 7.50
3	Broadview	3.50– 5.00	6.00– 8.00
4	Chase	5.00– 9.00	8.00–12.00
5	Claridge	3.50– 6.00	5.50– 9.00
6	Congress	5.00– 6.00	6.50– 7.50
7	DeSoto	4.00– 6.00	6.00–14.00
8	Fairgrounds	3.50– 6.00	5.75– 8.00**
9	Fairmont	4.00	5.00– 7.00**
10	Forest Park	4.00– 6.50	6.00– 9.50
11	Gatesworth	5.00– 6.00	6.50– 7.50
12	George Washington	3.00– 3.50	4.50– 6.00
13	Jefferson	4.50– 8.50	7.50–11.50
14	Kings Way	3.00– 4.50	4.50– 8.00
15	Lennox	4.00– 7.00	5.50– 9.50
16	Majestic	3.00– 4.50	5.00– 8.00
17	Mark Twain	4.00– 6.50	6.25– 9.50
18	Mayfair	4.00– 7.00	5.50–12.00
19	Melbourne	4.00– 8.00	6.00–11.00
20	Park Plaza	7.00–11.00	10.00–14.00
21	Roosevelt	4.00– 5.75	5.75– 8.25**
22	Sheraton	4.00– 8.85	6.75–12.00
23	Statler	4.00– 7.00	6.50–11.00
24	Warwick	2.75– 3.50	4.00– 6.00**
25	York	3.50– 5.00	6.00– 8.50**

* Rates for suites can be obtained from hotel accepting reservation.
** Suites not available.

Hotel Reservation Application . . .

93rd Annual Session
American Dental Association
September 8-11, 1952
St. Louis, Missouri

A. D. A. HOUSING BUREAU

911 Locust Street, Room 406, St. Louis 1, Missouri

INSTRUCTIONS:

Reservations for hotel accommodations may be secured by completing this application and mailing it to: A.D.A. Housing Bureau, 911 Locust Street, Room 406, St. Louis 1, Missouri.

Be sure to indicate your arrival time in St. Louis. Reservations will be held only until 6 p.m. of the day you indicate when you will arrive in St. Louis. Failure to notify the hotel of any last minute change in your arrival time may result in cancellation of the reservation.

Names of all persons who intend to occupy the accommodations must be listed on the application.

List four choices of hotels.

Confirmation will be sent indicating which hotel has accepted the reservation.

Write the A.D.A. Housing Bureau in St. Louis if you wish to cancel the reservation or make any change in your reservation and NOT the hotel to which you were assigned.

(Please print or type) A.D.A.

Applicant:

Name_____

_____
(Street address) (City) (Zone) (State)

Arrival in St. Louis_____ a.m. p.m. Leaving_____

Accommodations:

Hotel_____ (First choice) Hotel_____ (Third choice)

Hotel_____ (Second choice) Hotel_____ (Fourth choice)

☐ Single occupancy, rate to range from $_____ to $_____ per day.

☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day. } 2 names must be listed below

☐ Double occupancy, twin beds, rate to range from $_____ to $_____ per day. }

☐ Suite of_____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Occupants: (use an extra page for listing additional names if necessary)

Room will be occupied by:

_____
(Name) (Address) (City) (State)

_____
(Name) (Address) (City) (State)

proved . . . improved . . . approved

the ultimate in precise radiographic diagnosis

(short and long cone technics)

WEBER №11 RayDex

3 NEW LONG CONES

FLOOR TYPE

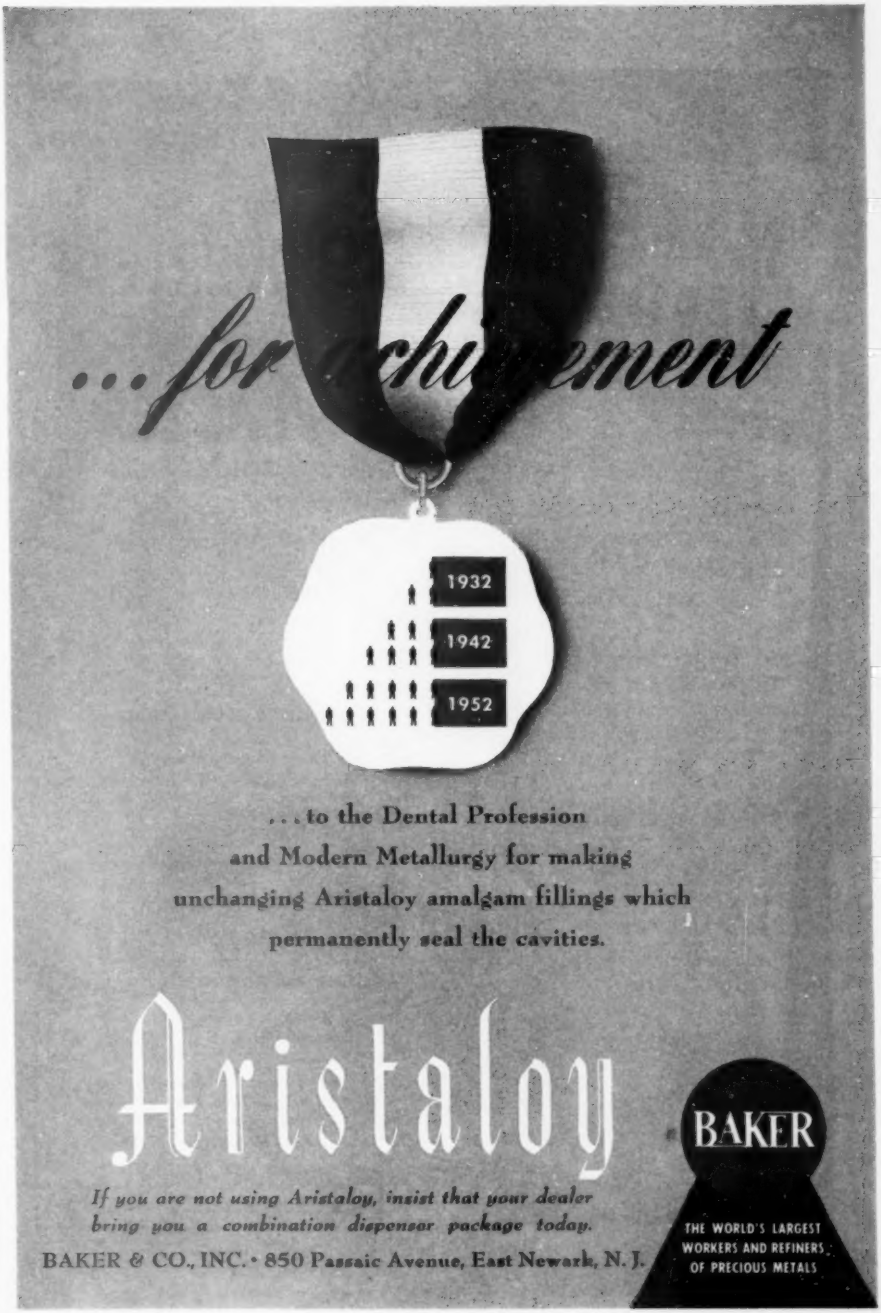
In Zone 1 - $ 995.00
In Zone 2 - $1015.00

The Preferred X-Ray
. . . at the lowest cost of all!

- ***scan-a-glance***
  meter mounting for better control of X-Ray factors.
- ***longer tube life***
  Tube is capable of 15 MA at 70 KVP, but X-Ray unit is rated at 10 MA at 45 to 70 KVP.
- ***penetration control***
  permits settings of 45 to 70 KVP in definite steps of 5 KVP.
- ***exclusive Raytheon filament stabilizer***
  Improved appearance and increased capacity. Holds tube current constant within 1/20th of a milliampere. (Optional at additional cost.)
- ***exclusive single switch***
  now controls both main power line and circuit breaker.
- ***maximum definition***
  obtained by a 1 mm square focal spot—an exclusive WEBER feature.
- ***reversible timer***
  helps insure correct exposure. If set incorrectly, the timer may be reset and over-exposure thus avoided. Calibrated from 0 to 12 seconds, with ¼ second intervals.

Feature for feature—dollar for dollar - WEBER *RayDex is the* BEST BUY

The WEBER Dental Manufacturing Co.
CANTON, OHIO and dealers in major cities



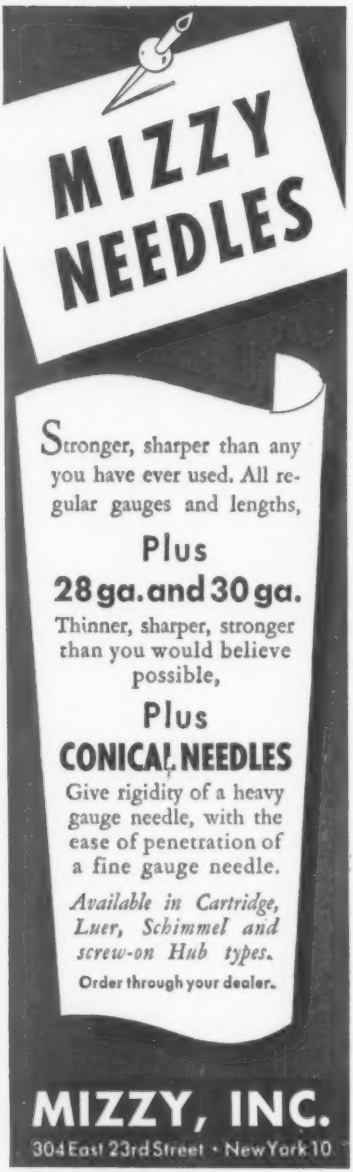
. . . to the Dental Profession
and Modern Metallurgy for making
unchanging Aristaloy amalgam fillings which
permanently seal the cavities.

Aristaloy

If you are not using Aristaloy, insist that your dealer bring you a combination dispenser package today.

BAKER & CO., INC. • 850 Passaic Avenue, East Newark, N. J.

BAKER
THE WORLD'S LARGEST
WORKERS AND REFINERS
OF PRECIOUS METALS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NEEDLES
Stronger, sharper than any you have ever used. All regular gauges and lengths,
Plus
28 ga. and 30 ga.
Thinner, sharper, stronger than you would believe possible,
Plus
CONICAL NEEDLES
Give rigidity of a heavy gauge needle, with the ease of penetration of a fine gauge needle.
Available in Cartridge, Luer, Schimmel and screw-on Hub types.
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MIZZY, INC.
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Prevent Makeovers and SAVE Valuable Time!

with

CLOVERLEAF

Impression

PLASTER

WINTERGREEN

OR UNFLAVORED

For faithful reproduction of every detail of teeth and tissue, dentists know they can trust Cloverleaf Impression Plaster. Sets rapidly and accurately; distortion-free; breaks with a clean fracture.

HARDITE STONE MODEL

Holds the case to unchanging dimension during curing. Laboratory controlled manufacture assures consistent uniformity of all properties essential to perfect fit and articulation.

Also manufacturers of: Standard Set Plaster; Hard Plaster; Laboratory Plaster; Vulcanizing Stone; Flasking Compound.

FREE SAMPLES to TEST AND COMPARE

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Bloomfield, N. J.

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Please send free sample of:
CLOVER LEAF XX Impression Plaster
☐ Wintergreen ☐ Unflavored
HARDITE STONE MODEL ☐

Dr.....

Address.....

City..... State.....

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means "original, before all others" . . .

FR X-Ray solutions were first in concentrated liquid form (more than 15 years ago). And through continuing research and improvement have maintained their years-ahead advantages.

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means "finest, better than all others" . . .

FR Concentrated Liquid X-Ray Solutions have proven their superiority in quality . . . accuracy . . . clarity . . . diagnostic detail in dental and hospital darkrooms all over America.

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means "safety, dependability" . . .

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Were, are, always will be FIRST!

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Exclusive distributors to the dental field for

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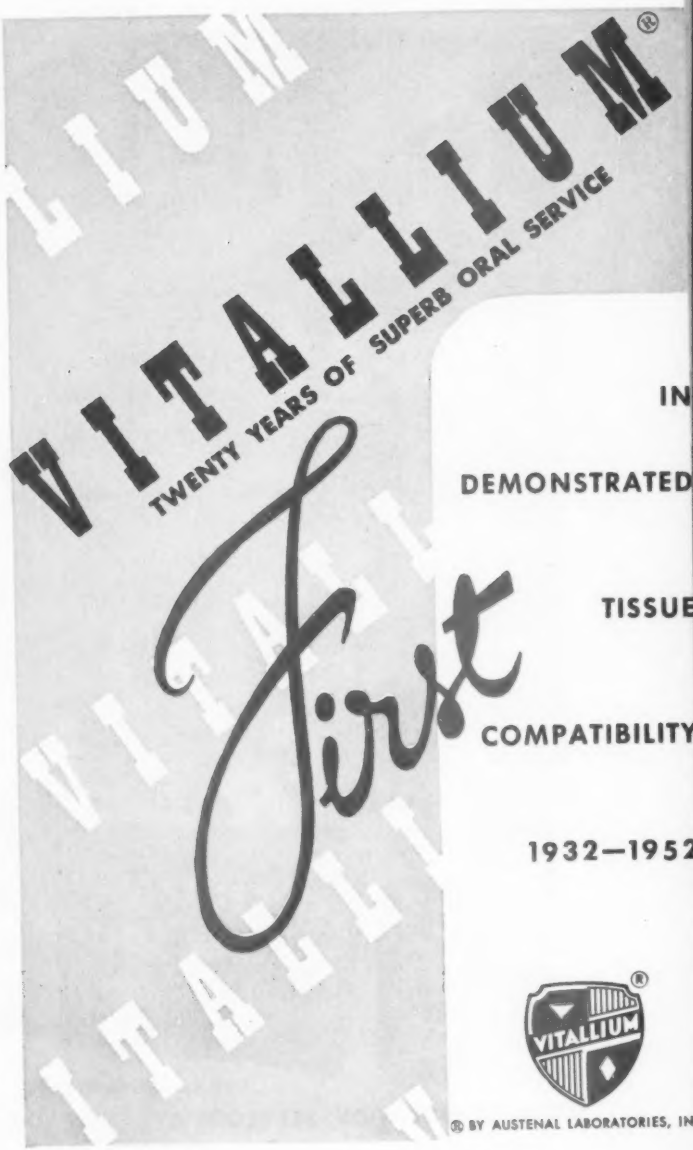
VITALLIUM®
TWENTY YEARS OF SUPERB ORAL SERVICE
First
IN
DEMONSTRATED
TISSUE
COMPATIBILITY
1932—1952
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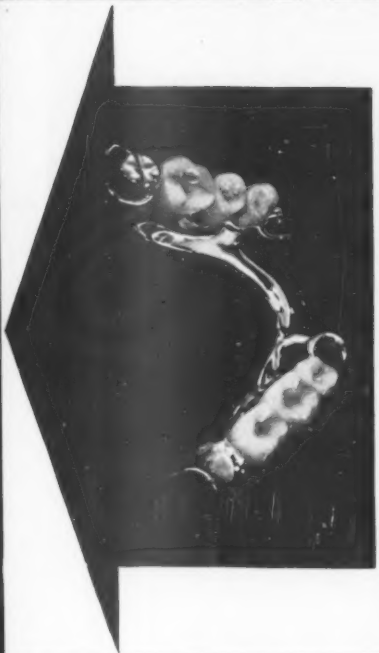
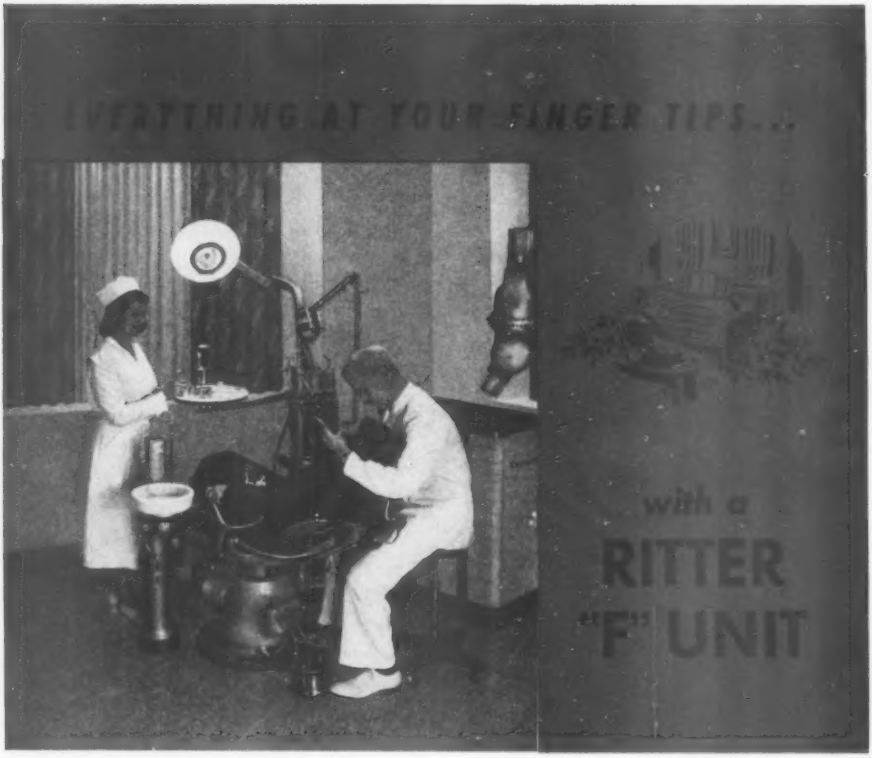


Quality controlled for 20 years for use in Dentistry and Surgery, Vitallium has proved beyond doubt it is more compatible with human tissue than any other alloy, precious or non-precious. The unique combination of quality controls and proved compatibility are an unequalled safeguard to your professional ethics and interests—and provide your patients with dental appliances you can rely upon.

Insist on genuine Vitallium appliances, processed only by authorized Vitallium Laboratories—leaders in their field the world over.

AUSTENAL LABORATORIES, INC.
NEW YORK • CHICAGO

THERE IS A VITALLIUM LABORATORY NEAR YOU

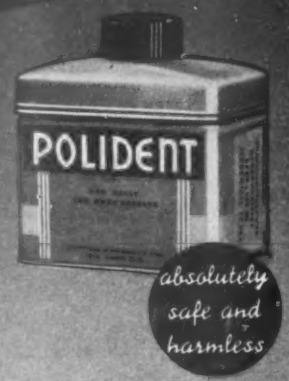


As the arrangement of the keys and stops on a pipe organ permits the artist to achieve perfection, so the design of a Ritter Model "F" Unit permits the fullest use of your skill. Within finger-tip reach you have a *complete set* of low voltage instruments, properly angled for easy grasp . . . the famous, silent Ritter engine with the greatest range of speeds at the handpiece, 1000-6500 r.p.m. With a Ritter "F" Unit you finish the day relaxed and with plenty of reserve. Ask your Ritter Dealer for a demonstration.

Ritter

POLIDENT

-now germicidal!



Now, at last, scientific research has succeeded in giving effective germicidal action to POLIDENT, the popular "soak-and-clean" denture cleanser. This significant advance in denture cleansing has been achieved by the incorporation in Polident of a new ingredient INTHOL, which exerts prompt, positive germ-killing action against oral organisms, yet is non-irritating and completely harmless to the patient and denture.

Here's what Inthol does:

Kills germs quickly
. . . dentures are fully sanitized.

Destroys odors
. . . dentures are odorless and "fresh."

Enhances cleansing penetration
. . . dentures are spotlessly clean.

HUDSON PRODUCTS · Jersey City 2, N. J.

POLIDENT *with* INTHOL®

More Dentists Recommend POLIDENT than any other Denture Cleanser

FREE

Send today for your complimentary samples of Polident with Inthol.

HUDSON PRODUCTS
Jersey City 2, N. J. Dept. E-42

Please send me Professional samples of the New Polident with Inthol.

Dr._____
Please Print

Address_____

City_____ State_____

On the job!

Our volunteer speakers are saving thousands of lives *today* . . . in factories and business offices . . . at neighborhood and civic centers . . . at social, fraternal and service group meetings all over this land . . . by showing people what they can do to protect themselves and their families against death from cancer.

In laboratories and hospitals, from coast to coast, our volunteer dollars are supporting hundreds of research and clinical projects that will save countless more lives *tomorrow.*

To find out what you yourself can do about cancer, or if you want us to arrange a special educational program for your neighbors, fellow-workers or friends, just telephone the American Cancer Society office nearest you or address your letter to "Cancer" in care of your local Post Office. One of our volunteer or staff workers will be on the job to help you.

American Cancer Society

INDEX TO ADVERTISEMENTS

April 1952

Abbott Laboratories A-66
American Cabinet Company A-51
American Cancer Society A-80
American Dental Assn. A-11, A-17, A-24, A-36, A-70, A-71
Ash, Claudius and Sons A-68
Astra Pharmaceutical Products, Inc. A-32, A-33
Austenal Laboratories A-76, A-77

Baker and Co. A-73
Blakiston Co. A-21
Bristol Myers Co. A-16, A-47
Burton Mfg. Co. A-6
Butler Co., John O. A-31

Castle Co., Wilmot A-37
Caulk Co., L. D. A-63
Classified Advertising A-26, A-27, A-28
Coe Laboratories A-58
Columbia Dentoform Corp. A-11
Columbus Dental Mfg. Co. A-9, A-42
Condit, P. N. A-11
Cook-Waite Laboratories A-23
Corega Chemical Co A-59
Cosmos Dental Products, Inc. A-5
Crescent Dental Mfg. Co. A-4

Dental Absorbents Co. A-62
Dental Gold Institute, Inc. A-1
Dental Perfection Co. A-62
Dentists' Supply Co. of N. Y. ..... 2nd Cover 4th Cover
Dresch Laboratories A-10
Dunhill of London A-62

Eastman Kodak Co. A-13
Exakta Camera Corp. A-36

Fleet Co., C. B. A-18
FR Corporation A-75

General Electric Co. A-20

Hanau Engineering Co. A-30
Hudson Products, Inc. A-79
Huntington Laboratories, Inc. A-6

Jelenko and Co., J. F. A-6, A-60
Johnson and Johnson A-41
Justi and Son, H. D. A-52, A-53

Lauer Metal Shop A-39
Lederle Laboratories A-22
Lippincott Co., J. B. A-43
Luxene, Inc. A-15

MacMillan Co. A-36
Medical Protective Co. A-62
Merck and Co. A-50
Mizzy, Inc. A-74
Mosby Co., C. V. A-46
Myerson Tooth Corp. A-34

National Dairy Council A-40
Ney Co., J. M. A-8
Novocol Chemical Co. A-69

Odontographic Mfg. Co. A-12
Oskar Shaefer A-55

Park Davis and Co. A-61
Pelton and Crane Co. A-7
Pfingst and Co. A-54
Plastodent, Inc. A-38
Professional Budget Plan A-19
Professional Printing Co. A-39
Prophylactic Brush Co. A-25

Ransom and Randolph Co. A-49
Reliance Dental Mfg. Co. A-65
Reserve Plan, Inc. A-3
Richmond Dental Mfg. Co. A-64
Rinn X-Ray Products, Inc. A-35
Ritter Co. A-78

Smith & Son Mfg. Co., Lee S. A-48
Squibb and Sons A-14

Ticonium A-29

Union Broach Co. A-39
U. S. Savings Bonds A-2

Weber Dental Mfg. Co. A-72
Wernet Dental Mfg. Co. A-44, A-45
White Dental Mfg. Co., S. S. A-56, A-57
Wiggin's Sons Co., H. B. A-74

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